Offshore Environmental
Studies Program

Fiscal Year (FY) 2002 - 2003 Annual Studies Plan

Pacific OCS Region

U.S. Department of the Interior
Minerals Management Service
Pacific OCS Region
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Introduction

The Environmental Studies Program in the Pacific Outer Continental Shelf (OCS) Region started in 1974. The Program has evolved with changes in the geographic areas of concern and study, in the emphasis of disciplines highlighted for research, and in the emphasis of oil and gas activities from prelease activities to postlease activities. This plan complements and reinforces the Environmental Studies National Strategic Plan.

Oil and gas leasing will not occur until after 2012 in the Pacific OCS Region, based upon the Presidential leasing moratorium announced in June, 1998. Existing production and development activities and exploration and development of known resources on existing producing leases in Southern California will continue. Future exploration and development activities could occur on the thirty-six undeveloped leases starting in 2001-2002. The projected OCS activities section of this report more fully discusses the activities we anticipate on existing leases.

This document presents a strategy for the Pacific Outer Continental Shelf (OCS) Region. It applies not to the entire Pacific OCS Region, which stretches from the United States-Mexico border to the border with Canada and includes Hawaii, but specifically to the Southern California Planning Area (see map inset, figure 1). This plan focuses on the information needed for the Southern California Planning Area, especially the Santa Barbara Channel and the Santa Maria Basin.

The plan generally describes currently available information about the planning area. The plan refers to detailed synopses, reviews of the Program, and scientific literature as justification for general statements of available information.

One section of the plan identifies the information the Minerals Management Service needs for decisions by discipline and in varying levels of detail. The identified information is considered important and relevant to decision making. We consider scientific information needs not identified in this plan less important for one of several reasons:

- they may not provide significant new or additional information beyond what is already known;
- they may not be within the financial scope or time frames of the Program;
- they may provide insight into small scale or relatively insignificant processes, which are swamped by much larger processes both natural and anthropogenic; and
- they may not yet be within the grasp of science's present abilities or understanding of experimental methods to gain the information.

Changes in future OCS oil and gas activities may dictate changes in the strategy. Findings from current or future research may also change the strategy and cause other avenues of research to be incorporated.

If you have any questions regarding this draft Pacific OCS Region Environmental Studies Plan, please contact Dr. Fred Piltz, Chief, Environmental Studies Section, Pacific OCS Region at (805) 389-7850. You can also view the Minerals Management Service and Pacific OCS Region home pages at ***www.mms.gov*** for additional information.

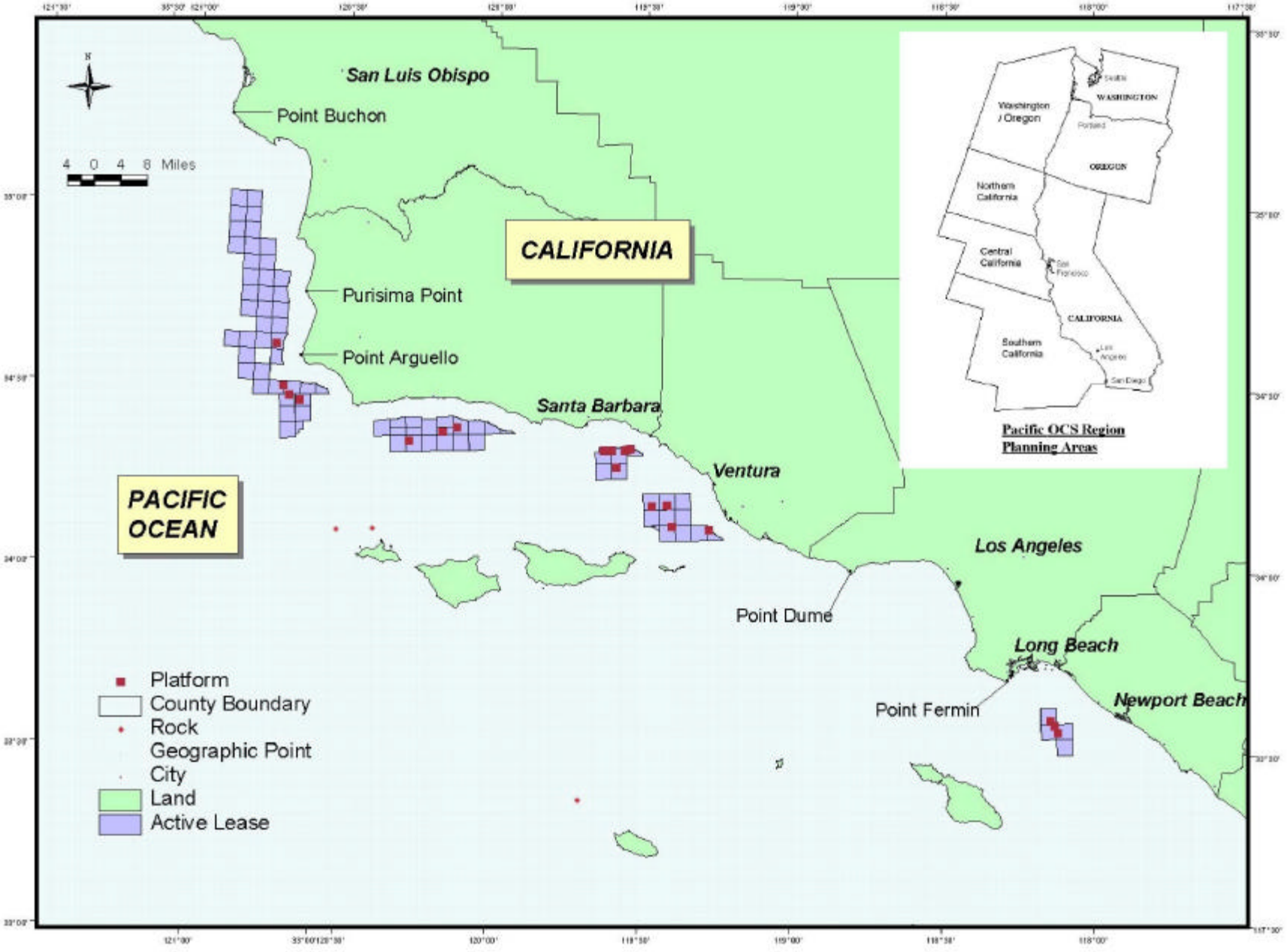
The studies funded by the Pacific OCS Region emphasize four themes:

1. Learning more about the effects of postlease activities (exploration and development). These are primarily focused on the Santa Barbara Channel and Santa Maria Basin.

2. Gaining more information on what environmental effects may result from the partial or complete removal of oil and gas of platforms and other offshore facilities currently in place.

3. A continued emphasis on "socioeconomic" research.

4. Monitoring (long-range programs of regular measurements) of certain aspects of the intertidal environment, and fostering partnerships with other Federal, state, and local government agencies involved in monitoring research.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Geographic Point
City
Land
Active Lease
Washington / Oregon
WASHINGTON
OREGON
Northern California
Central California
CALIFORNIA
Southern California
Pacific OCS Region
Planning Areas

Projected OCS Activities

Prelease

We anticipate no lease sales for this planning area under the current MMS Comprehensive Leasing Program for 1997-2002 nor are any projected until after the year 2012.

Postlease

The Southern California Planning area contains

- 79 active oil and gas leases
- 600 million barrels of oil in proved reserves
- Up to one billion barrels in unproved reserves
- Upwards of 3 billion barrels of undiscovered, economically-recoverable resources under unexplored acreage.

The presence of the oil industry in the Southern California Planning Area is projected to diminish over the next decade or so, although present oil and gas production levels could be sustained during much of that same period. There are 36 undeveloped leases in the Southern California Planning Area. These leases are currently consolidated into 9 units and one non-unitized lease. Within 18 months, these leases will likely be further consolidated into 6 or 7 units. Oil reservoirs in some units can be developed from existing platforms with extended reach drilling technology. Beginning this year (2000), unit operators for the 36 undeveloped leases are expected to submit exploration and/or development and production plans. If the proposals submitted to the MMS by the operators are pursued and approved by appropriate local, State, and Federal agencies, up to 4 additional OCS platforms could be anticipated late in the next decade or soon thereafter to develop the resource - about a billion barrels of oil.

Extended reach drilling from a platform can be used to significantly enlarge the area from which a given platform produces oil. Therefore, improvements in extended-reach drilling technology can reduce the number of platforms that would be needed to produce the projected volume of oil.

Decommissioning activities will be an increasingly important part of this Region's activities over the next decade. Within the next decade or so, several existing OCS platforms could be removed in waters off Santa Barbara and Ventura Counties. Decommissioning activities related to associated onshore facilities and offshore pipelines are also expected to increase .

There will be no need for any new onshore facilities to support offshore development along the entire south coast, from Point Conception to the Ventura/Los Angeles County boundary. The only new onshore facility needed might be in northern Santa Barbara County. The California Offshore Oil and Gas Energy Resources Study [COOGER] shows that even the highest probable level of development of the undeveloped State and Federal leases would result in a net reduction of onshore facilities in the Tri-Counties area over the next decade or so.

Available Information

Physical Oceanography

The MMS, by way of a cooperative agreement with the Scripps Institution of Oceanography, is conducting the Santa Barbara Channel-Santa Maria Basin (SBC-SMB) Circulation Study to support postlease decisions and long-term monitoring for the area. This study is providing information and understanding of circulation in the area of oil and gas activities sufficient for most pre- and postlease decisions. One of the products of this study is a comprehensive physical oceanographic database, called the AScripps Data Zoo,@ which is accessible to the public by way of the Internet. The Scripps Data Zoo contains all physical oceanography data collected offshore the U.S. West Coast, including the new data sets being obtained in the SBC-SMB Circulation Study.

A panel of nationally known physical oceanographers reviewed the research effort conducted by the Scripps Institution of Oceanography, with regard to the recommendations made by the National Research Council in 1989 and judged that work to be state of the art and adequate for future decision making.

The physical oceanographic information from this research will support post-lease decisions concerned with development and production in both the SBC and SMB. These data are valuable for preparation of exploration plan, development and production plans, oil spill contingency plans, environmental assessments, and environmental impact statements which are required and used by state and federal agencies. For example, the California Coastal Commission uses these documents to determine if projects are consistent with California's Coastal Management Program, (Alison Dettmer, California Coastal Commission, personal communication, July 9, 1997).

Data from moorings, wind stations, and satellite imagery with event driven deployments of surface drifters provide information needed for full interpretation of numerous MMS and non-MMS biological studies. As a spin-off to our research, these data were critical to Federal and state regulatory agencies, such as the U.S. Coast Guard, NOAA and the California Department of Fish and Game. The OCS Lands Act and the 1989 and 1990 National Research Council (NRC) recommendations support such long term environmental measurements.

The Central California Circulation study was an observational study with seasonal conductivity temperature density (CTD) surveys, drifter studies, and 11 moorings deployed on the shelf and shelf break along the coast between San Francisco and Point Conception. The 1982-84 Santa Barbara Channel Circulation Study provided a numerical circulation model and an observational database.

Atmospheric Sciences

The Pacific Region completed several pioneering efforts in air quality measurements and modeling during the 1970's and 1980's. These studies resulted in information about the dispersion of pollutants from a point source over nearshore water, the nature and amounts of air pollutants generated by oil and gas platforms, and a measurement of levels of fugitive hydrocarbons. In addition to field studies,

several models of both inert and photochemical pollutant action in the atmosphere are available and have been refined by MMS-funded research. A study of fugitive hydrocarbons emitted from OCS platforms in California has improved existing knowledge of potential air pollutants from offshore oil and gas activities.

The MMS's Technology Assessment and Research Program (TAR) has also funded several air quality studies, such as NOx reduction and air quality assessments of in situ burning. The TAR Program conducts studies a variety of offshore engineering topics, such as the structural dynamics of OCS structures, blowout prevention, and the improvement of oil-spill containment and cleanup equipment and techniques.

Fate and Effects

Considerable literature exists about the acute effects of most of the routine or accidental discharges possible from oil and gas activities (Neff and Anderson, 1981; NRC, 1983). The early concerns about the toxicity of crude oil and refined products have resulted in the tests of hundreds of types of crude oils and components of crude oils on more than 100 marine invertebrates and vertebrates. These tests have included life stages from egg and larval stages to adult organisms. Sufficient laboratory tests of acute exposure to most discharges have been conducted, and further tests are not warranted.

The National Research Council (NRC, 1983) report on the effects of drilling fluids in the marine environment concluded that the acute effects of these discharges on marine life were quite well known. Neff and Anderson, 1981, provide additional research results and similar conclusions. The long-term fate of drilling mud and cuttings discharges in the Pacific Region was examined by Continental Shelf Associates, Inc. (Continental Shelf Associates, 1985).

The 1992 International Produced Water Symposium provided a forum to hear and discuss the latest information related to the environmental considerations of produced water discharges (Ray and Engelhardt, 1992). Additional laboratory and field experiments are being performed by scientists at the University of California, Santa Barbara. This research program will provide sufficient information for most postlease oil and gas decisions to be made in the southern California area. Some results of these studies are published in the 1992 Symposium.

In 1992, the MMS published a collection of papers and reports that discussed benthic sediment movement on the southern California shelf and slope and how barite may affect benthic biological communities (Battelle Ocean Sciences, 1992). These reports, generated from the long-term research program "California Monitoring Program" (CAMP), greatly contributed to the understanding of the stability of sediments and drilling muds. In addition, CAMP has provided sufficient information about the long-term effects of drilling from OCS production platforms in areas of hard substrate biological communities. These data may be extrapolated to most similar benthic communities in California. In 1995 (SAIC, 1995) completed CAMP Phase III Program (AMonitoring Assessment of Long-Term Changes in Biological Communities in the Santa Maria Basin@). See the Benthic Biology Section below for further discussion.

Biology

The MMS funded a major reference work published in 1990 by Dailey, et al. entitled AEcology of the Southern California Bight@. This reference is cited below several times and will serve the reader and student of marine science well in understanding the level of knowledge available about the oceans offshore of Southern California. This reference captures much of the detailed knowledge available to the MMS and other resource managers.

Intertidal Biology

The shoreline has been mapped several times, and good data exist to delineate the nature of the beaches along the coast. For Santa Barbara County, this information has been placed in a computer database, along with a description of the shoreline resources (marine mammals, seabirds, intertidal, subtidal and wetland resources), bibliography of pertinent studies, and natural history information.

A number of studies on the effects from oil spills on the shoreline communities have been completed, especially in connection with the *Exxon Valdez* oil spill. In an effort which is now nearing completion, the MMS is jointly sponsoring the writing of a Rocky Intertidal Handbook which will discuss procedures and methods which could be used in the event of an oil spill to evaluate impacts or conduct NRDA studies.

The Multi-Agency Rocky Intertidal Network (MARINE), a network of rocky intertidal sites along the Southern California mainland and islands has been formed to improve our current knowledge of rocky intertidal communities, population dynamics, and changes which may signal harmful human effects. This network of 61 sites is maintained by over a dozen federal, state and local agencies, and private groups. Some of the areas have been monitored for several years by individual groups. In combination, the data will provide scientists with early warning tools to detect regional changes.

The National Park Service has sponsored several studies to evaluate the effects of human activities in coastal parks, including the Channel Islands National Park and Cabrillo National Monument. The focus of these studies has been to determine and monitor the effects of public visitation, such as trampling and taking/harvesting plants and animals. Sea Grant has funded additional studies in Orange County which evaluate the effects of public visitation on intertidal resources at heavily visited Orange County beaches. In particular, these studies contrasted beaches which are formally protected against those which are not protected and found that illegal harvesting, and excessive trampling occurs just as frequently at protected sites. Information from these studies assists the MMS in evaluating the potential effects of oil and gas activities by putting into perspective possible other anthropogenic effects.

Benthic Biology

A large information base exists on hard substrate and soft substrate fauna and flora distribution and abundance within the Southern California Planning Area. Much of this information was generated by the comprehensive southern California baseline marine biological surveys conducted by the Bureau of

Land Management (Douglas, et al., 1978a, 1978b; Fauchald et al., 1978a, 1978b, 1978c; and Wolfson et al., 1978). More information (ecological relationships and life histories) is known about shallow-water (<30 m) benthic habitats than about the deep-water (>30 m) benthic habitats (Dailey et al., 1990). The Pacific Region has digitized data (MMS geophysical and geological information obtained from seismic surveys) on the range and extent of the planning area's hard substrate and has produced computer generated maps.

Information on the benthic environment of the area (includes the Southern California Bight and offshore islands and basins) is summarized in Dailey et al. (1974 and 1990). The National Research Council (1989) concurs with the above in their report, which states "subtidal benthic communities have been well described through numerous studies, many supported by the MMS and its predecessor the Bureau of Land Management, and the MMS has adequately summarized these investigations." A taxonomic atlas to many of the species collected and described by MMS supported scientists has been prepared as a reference for others.

Many marine biological surveys that have been conducted for MMS postlease activities have further characterized the benthic environment in the area (Benech Biological and Associates, 1986; Dames and Moore, 1982a, 1982b; Hooks McCloskey & Associates, 1982; McCelland Engineers, 1984, 1985).

The California Monitoring Program (CAMP) was conducted as a three-phase study. It addressed long-term monitoring of the hard-bottom and soft-bottom benthic environment of the Santa Maria Basin in the vicinity of existing development and production platforms. This study gathered physical, chemical, and biological data prior to, during, and after drilling to determine the possible effects of offshore oil and gas development activities on these parameters. These studies have shown no statistically significant long term effects to the marine environment from OCS activities. Biological field characterizations of hardbottom communities were conducted at Platform Hidalgo hardbottom sites; in situ larval settling experiments with red abalone were conducted in the vicinity of Platforms Harvest and Hermosa; and laboratory toxicity (drilling muds) tests were conducted on red abalone larvae and adult cup corals. Also, physical and chemical processes, such as near-bottom currents, the scale of regional currents, particle fluxes at high and low relief heights, sediment resuspension, and the chemical concentrations of contaminants in bottom sediments and suspended particles, were assessed. The final report for Phase III was completed in January 1995. Final reports are available for the Phases I, II and III (see Battelle Ocean Sciences, 1991, Science Applications Inc., 1986, and Science Applications Inc., 1995).

Science Applications, Inc. (1988) conducted a literature review of benthic recovery and recolonization studies on the California OCS. They also gathered and analyzed information on anchor design and disturbance to hard substrate communities.

Considerable data on benthic communities have been collected by municipal sewage districts adjacent to their discharges in southern California for more than three decades. These data are supplemented by collections and reports by the Southern California Coastal Water Research Project. (SCCWRP)

The MMS conducted a three-year research program that evaluated the effects of anchoring and drill cuttings on hardbottom communities to ascertain the effects of exploration in the vicinity of such rare biological habitats. "Disturbance of Deep-Water Reef Communities By Exploratory Oil and Gas Operations" is an MMS study that investigates the physical and biological impacts on hardbottom reef communities from exploratory drilling operations (i.e., anchor placement and drill cuttings disposal) in the Santa Barbara Channel and Santa Maria Basin. Sidescan sonar surveys, remotely operated vehicle biological field surveys, and sediment analyses of drill cuttings were conducted at the selected exploration well sites to determine the long-term impacts of exploration operations on deepwater hardbottom reef communities. Recovery rates of reef communities and causal relationships of exploration operations (for example, anchor and equipment handling) to impacts were examined (MEC Analytical Systems, Inc., 1995).

The Taxonomic Atlas of the Benthic Fauna of the Santa Maria Basin and Western Santa Barbara Channel was completed by SAIC (1993;1994;1995;1996). The Atlas consists of 14 volumes with keys, descriptions, and illustrations of soft and hardbotton organisms that were collected as part of the CAMP Phase I Reconnaissance and Phase II Monitoring Programs.

Information concerning the contribution of invertebrate and algal communities to the general ecology in and around oil and gas platforms in the Pacific OCS POCS Region is being collected through a study entitled ***Survey of Invertebrate and Algal Communities on Offshore of Oil and Gas Platforms in Southern California***. This study is a comprehensive survey of invertebrates and algal communities associated with oil and gas platforms and adjacent natural reefs.

Fishery Biology

There is sufficient information on the description of fish habitats and communities within the planning area, including documentation regarding diversity, abundance, and seasonality. Most of the life history studies have been limited to important commercial or abundant shelf species (Dailey et al., 1974, 1990).

The MMS is interested in research involving oil and gas platforms and the associated ecological role of fish communities at such hard substrate structures. *The Ecological Role of Natural Reefs and Oil and Gas Production Platforms on Rocky Reef Fishes in Southern California,* a joint research project between the MMS and the Biological Resources Division (BRD), of the U.S. Geological Survey (USGS), has almost been completed. The three-year study, responding to information needs identified by the MMS, is managed by BRD through a cooperative agreement with the University of California-Santa Barbara. The research area includes both the Pacific Outer Continental Shelf (OCS) and State of California waters. It involves fifteen OCS (Federal) and two state of California oil and gas production platforms located near Pt. Arguello in the Santa Maria Basin, in the Santa Barbara Channel, and off Huntington Beach. In addition, research is being conducted at adjacent natural reefs in both shallow and deep water. A interim report was published in 1999.

A pilot study (Imamura et al., 1992) examined the distribution and abundance of rockfish around Platform Hidalgo and at eight adjacent natural reefs. Study results indicate distinct differences in the fish assemblages between Platform Hidalgo and nearby reefs.

The results of an MMS-funded study (Battelle et al., 1987) indicated that rockfish catchability (Catch-Per-Unit-Effort) was significantly reduced while air guns, similar to those used in seismic surveys were operating. However, that study did not answer questions concerning the persistence or spatial extent of the impacts. Studies funded by industry and the MMS have also shown little effects of air guns on the survival of various larvae including dungeness crab and anchovies.

The National Marine Fisheries Service (Southwest Fisheries Science Center (SWFSC)) has completed a study for the MMS which summarizes the identification of early stages (fish egg and larva) of 500 California Current fish species. This study, *The Early Stages of Fishes in the California Current Region,* is a descriptive and illustrative guide (approximately 1,000 pages) based on the annual ichthyoplankton field surveys conducted since 1949 by the SWFSC as a part of the California Cooperative Oceanic Fisheries Investigations. The Final Technical Report was completed in July 1996 and is available from the California Cooperative Oceanic Fisheries Investigations (CalCOFI, 1996).

Adequate information is also available on the spatial and temporal patterns of distribution and abundance for most fish in the planning area, except for fish in canyons, deep banks, and sea mounts (Dailey et al., 1990).

Protected Species

Seabirds

The MMS has funded major research efforts on the Aat sea@ distribution and abundance of seabirds offshore California. One study, conducted from 1975-1978, covered the entire Southern California Bight up to 200 miles offshore (Briggs et al., 1981 and 1987b). Another study, conducted from 1980-1983, covered all of central and northern California up to 185 km. offshore (Briggs et al., 1983 and 1987b). A third study covered a much smaller area (offshore Monterey, CA), but examined in detail the relationship between seabird distribution and physical oceanographic conditions (Briggs et al., 1987a). Through another MMS-funded contract, data from these Aat sea@ studies were combined into a single database system (Environmental Consulting, Inc., 1992). This database system allows for the rapid retrieval of seabird densities and distributions for any given species, year, season, and area of coastal California. A CD-ROM containing this database system was developed and made available to other agencies, universities, and researchers.

The MMS has also funded two major studies of California seabird colonies, one in 1980 (Sowls et al., 1980) and one in 1990-91 (Carter et al., 1992). These studies provide valuable information on the species composition, size, and location of seabird colonies in California.

The acute and chronic effects of oil and its metabolites upon seabirds are adequate to make assessments of possible oil-seabird contacts. Nero & Associates (1983), examined the seabirds' behavior and interactions with crude oil, and they also compiled an oil-seabird interaction annotated

bibliography. Fry's 1987 work on seabird-oil ingestion dramatically increased the understanding of these effects.

Data have been collected on the abundance of shorebirds in Ventura County through the efforts of MMS scientists in the Pacific OCS Region. This in-house study has collected data for shoreline segments in Ventura for three years and a final report is available. This effort has been expanded into Santa Barbara and San Luis Obispo counties.

Marine Mammals

The MMS has been the largest source of funding for marine mammals studies in the United States (NRC, 1992). The studies resulting from this funding and other non-MMS efforts have provided an excellent base of information on the seasonal distribution and abundance of California marine mammals (Dohl et at., 1981, 1983; Bonnell et al., 1981, 1983; Calambokidis, et al., 1990; and Siniff and Ralls, 1988). The Ford (1992) database, mentioned above, also contains much of this marine mammal distributional data. In the 1990s the National Marine Fisheries Service conducted aerial and ship based surveys to provide data for assessment of U. S. Pacific marine mammal stocks (e.g., Barlow, et al., 1995)

Much is known on the effects of oil upon marine mammals (Geraci and St. Aubin, 1980, 1982, 1985, 1990; Braithwaite, et. al, 1983; Costa and Kooyman, 1981, 1982; Tetra Tech, 1985; Geraci and Smith, 1976a, 1976b; Engelhardt et al., 1977; Geraci and Williams, 1990; and Engelhardt, 1981). and the sources and characteristics of underwater sound as it relates to marine mammals (Gales, 1982; Greene, 1981, 1987; Miles et al., 1987; Richardson et al., 1991, 1995). The effects of underwater noise and disturbance to marine mammals have been investigated in recent years (Richardson, 1985; Malme et al., 1983; Richardson et al., 1991, 1995). Extensive studies on the capture, cleaning, and care of oiled sea otters have also been conducted (Davis, et al. 1988a and 1988b; and Geraci and Williams 1990).

Social Sciences and Economics

The MMS studies completed since 1977 address a wide range of social science and community development questions within the Pacific Region and include 4 archaeological studies, 3 recreation and tourism studies, 2 baseline studies, 5 economic studies, and 4 sociological/ethnographic studies. These studies provide the foundation for follow-on studies. For example, several studies currently conducted under a cooperative agreement with the University of California at Santa Barbara address current issues, building on the past work. Section 3 describes these on-going studies.

The five economic studies completed to date analyzed potential general effects of OCS development on coastal communities in the Southern California Planning Area (Blaney-Dyett, 1981; Centaur Associates, 1984) and the Central California Planning Area (Wambem and Osborne, 1980) as well as effects to specific sectors, such as commercial fishing (Centaur Associates, 1984). Over time, Pacific OCS activity became more focused in the Southern California Planning Area. Follow-on studies concentrated on the social and economic development of Santa Barbara Channel and Santa Maria

Basin communities, expanding and updating earlier analyses. These studies revealed that within the planning area, experience with and the effects of offshore development varied within and between communities in the planning area because of a number of long-term and short-term factors (Lima and Woolley, 1990, 1991; Lima, 1994; Molotch and Freudenburg, 1997; Smith, 1998). Research on the development of the petroleum extraction industry reveal a similar pattern of experiences (Nevarez, 1998, Paulsen, 1998, Beamish, 1998).

Ongoing studies described in section 3 examine the complex social and economic relationships initially revealed by the earlier studies. The study, Social and Economic Adaptations by Fish Harvesters in the Santa Barbara Channel-Santa Maria Basin Area, California, focuses on the local commercial fishing industry, arguably the OCS's major competitor for ocean "space" and one of the industries potentially most affected by OCS development. This study analyzes changes in catch, technology, the social organization of the fishers working in this area, and the extent to which these changes may have resulted from OCS activities. Knowledge of type and extent of conflict between the commercial fishing industry and OCS development is useful in planning further developments and mitigating their consequences. Similarly, the California Offshore Oil and Gas Energy Resources Study (Hargis, et al., 2000) examines OCS development scenarios and onshore constraints using information developed from earlier studies. Such information was also used in the Petroleum Extraction Industry in Ventura, Santa Barbara, and San Luis Obispo Counties studies (Paulson, et al., 1998, Nevarez, et al., 1998, Beamish, et al., 1998).

Of the number of research areas referred to by the MMS as "social science", archaeology is especially adequate to meet both the agency's needs and legislative mandates. The work by Espey, Houston & Associates (1990) culminated an extensive research undertaking that addresses all planning areas. The archaeology studies provided information regarding the affected environment and the probable and known location of the resources. This study serves as a model for maritime and shipwreck archaeology projects for other Federal agencies and was instrumental in providing information on a recent revision to a Notice to Lessees on archaeological resources.

Somewhat dated recreation and tourism research (Granville Corporation, 1981; Dornbush, 1987) provides limited insight. Methodological sophistication in this research topic evolved since these studies were completed. While follow-on research clarified some of the methodology and the findings of these initial studies (Kruger, et al., 1991), more rigorous studies focused on areas of expected development are needed. The studies examined the relationship between OCS activities and changes in coastal recreation and tourism patterns. The study's findings were not conclusive regarding the magnitude and significance of potential changes. As such, the relationship needs to be further examined and the inventory of coastal tourism and recreation facilities updated.
Two baseline studies provide generally adequate socioeconomic data for the entire Pacific Region (MMS, 1987, 1988). As collections of bulk demographics and economic data, the baseline studies are now dated and offer only the most general levels of analysis. However, on-going studies will update the data for areas of current OCS activities.

In summary, previous MMS socioeconomic research provides the initial building blocks for understanding basic socioeconomic data and historical and sociological processes in the Pacific Region and for designing a socioeconomic research program for the Region. Follow-on research

expands this basic understanding. For example, the ongoing study, Data Analysis and Synthesis of the Tri-County Socioeconomic Monitoring and Mitigation Program, analyzes the most complete offshore oil and gas industry database on the demographic characteristics of industry employees. It reviews almost ten years of survey data of demographic and other characteristics of industry employees working offshore California.

Identification of Information Needs

Physical Oceanography

Long term physical oceanographic records are important to ongoing and future biological studies being conducted in the area of active leases. Specifically, this long term physical oceanographic monitoring is required to support the USGS Biological Resource Division's Seabird and Marine Mammal Study being conducted for the MMS, the MMS Intertidal Study, the Santa Maria Basin Shorebird Study, and in the future, a long-term benthic monitoring program. Long term physical oceanographic records will greatly enhance researcher-s ability to address inter-annual variability in the data already collected.

Adequately describing important physical oceanographic processes such as the Western Jet which can sometimes be seen offshore of Pt. Arguello and the anti-cyclonic eddy that forms between Pt. Arguello and Avila Beach, further north along the central California coast, is very important in addressing environmental concerns associated with the proposed increase in OCS oil and gas development to take place in the Santa Maria Basin.

Nearshore circulation studies conducted in the SBC and the SMB are needed to determine the current flow patterns in state waters that effect biological parameters and the trajectory of oil spills nearshore. Near site-specific wind and current data are required for various MMS biological studies and oil spill trajectory prediction models such as the: (1) OSRA model; (2) NOAA HAZMAT model (for OSR); and (3) the Offshore Operator Committee's (OOC) mud discharge and produced water dispersion model.

Fates and Effects

The effects of high energy seismic acoustic impulses on marine mammals is a subject currently of intense interest. A multiparty working group, the High Energy Seismic Survey (HESS) team has addressed the procedures for permitting future seismic surveys offshore southern California. The MMS expects to also learn more about this topic from MMS funded studies. The information gained from the research is important to the MMS because of its authority to issue permits for seismic surveys associated with oil and gas activities.

Over 2,000 natural petroleum seeps, some emitting as much as 100 bbls. per day have been documented in the Santa Barbara Channel. However, existing data cannot provide required information regarding the location and volume of natural seeps north of Point Conception. There is also no fingerprint information for oil coming from the natural seeps in this area. When spills occur from OCS facilities, we are unable to differentiate between oil along the shoreline caused by our facility and natural oil seep contamination. Likewise, when oil is identified along the shoreline, it is difficult to conclusively demonstrate that the oil is not from OCS operations. This lack of information severely limits our ability to analyze risks to the marine environment from oil and gas operations when we write environmental documents for exploration plans and development plans.

Biology

A concerted effort is being made to integrate biological sciences with the other sciences such as physical oceanography and data management, especially where long time-series data are planned. Long-term data from the interagency intertidal monitoring network are being coupled with long term oceanographic measurements.

Intertidal biology requires study so that potential or real effects from oil and gas operations are not erroneously confused with broader regional changes in marine nearshore and coastal ecosystems.

Studies of benthic biology will be on processes that cause change in deep-water benthic communities. Such processes are currently not well understood, and measurements of natural variability in population levels of organisms have only recently been addressed in a few habitats

One area of on-going and possible future research is the role which colonization of structures (e.g., oil-platforms) by invertebrates and algae play in the general ecology of the ocean. This information may prove significant to decision makers with regard to future decommissioning of oil and gas platforms. In addition to providing information on the role that such structures play in the ecology of recreational and commercial fish (e.g., rockfish) and invertebrates (e.g., crab), the research should prove useful in determining whether the marine environment is enhanced by these structures.

The MMS may require additional information on the duration of the effects of seismic surveys on fish catchability. Such information would be useful in the seismic permitting and approval process and when issuing Geophysical and Geological Permits for any future activities. In addition, the Region requires recent data on commercial and sport fish catches in the areas of active oil and gas production and future activities in order to judge the appropriate mitigation which might needed to avoid space use conflicts.

Protected Species

MMS environmental analysts, scientists and managers need information on many aspects of the biology of protected species (marine mammals, seabirds, and coastal birds). These include information on species occurrence, population status, patterns of seasonal distribution and abundance and the ecological processes that influence these patterns, nesting and breeding areas, foraging ecology and important feeding areas, sensitivity to offshore oil activities (e.g., construction, high energy seismic surveys, other noise) and accidents (e.g., oil spills). More detailed and recent data on the distribution and abundance of seabirds and marine mammals are needed.

In 1994, the National Research Council (NRC) produced a study examining the current state of knowledge and ongoing research on the effects of low-frequency sound on marine mammals. Among the human-made sources of low-frequency sound identified were ocean-going vessels; seismic surveys; dredging, drilling, and construction; sonar; and acoustic oceanographic research. The study

concluded that existing data were inadequate for predicting or evaluating the effects of intense low-frequency sounds on marine species. The MMS has, and is continuing to develop possible studies to satisfy information gaps identified on this topic that relate to low-frequency sound produced by OCS activities.

Social Science and Economics

The identification of development-related social science studies including economics arises from:

- National Research Council reports,
- Comments by local government agencies, in Santa Barbara, Ventura and San Luis Obispo counties, concerned about onshore impacts associated with offshore oil and gas activities,
- Executive Orders, and
- The results of MMS-sponsored research efforts such as COOGER.

Building on previous and current economic and social science studies, studies in the near future will continue to update baseline information and analyze social, political, and economic factors that influence OCS development. Other studies will examine the relationship between offshore oil and gas activities and coastal recreation and tourism. These studies update the coastal recreation facilities information and help decision makers to understand how the public values these amenities. Anticipated studies, such as an analysis of mitigation measures, will gage the effectiveness of mitigation strategies in light of this valuation data. Finally, studies will analyze how the public frames offshore and other development issues, how claims are made on decision making, and how these claims are constructed and contested among stakeholders in the public arena.

The decommissioning of major offshore oil and gas facilities in the Pacific OCS has emerged as an activity whose potential social and economic effects must be sufficiently understood to support the environmental assessment process. Issues involve changes in land use onshore subsequent community development. Offshore, the issues revolve around the conversion of offshore facilities to artificial reefs and the consequential change in utilization of the fishery.

Emerging issue areas from within the Federal government include environmental justice (also known as social justice) and the related but more broad concepts of sustainable community development. Where appropriate, studies analyze any potential environmental justice considerations.

Other: Information Management

Information management is an area which has shown improvement in the Pacific OCS Region. The MMS is moving from a complete reliance on hard-copy (printed) information base to modern electronic/magnetic media (computers). Additionally, the Region plans to utilize Geographic Information System (GIS) technology more extensively in future activities. A cooperative agreement with academic, State and other Federal agencies for GIS data sharing and coverage development is seen as a regional goal. All computer database development and GIS will be compatible with the

MMS TIMS system. Such databases and GIS coverages are a great asset when preparing environmental documents for future oil and gas activity in the Region.

Topical Areas for the Year 2003

It is clear that research into the specific ecological consequences of alternative offshore oil and gas facilities decommissioning practices should be a topic of the Environmental Studies Program in the Pacific Region. This research is being extended into a study of the role algae and invertebrates associated with offshore structures play in the ecosystem. Future studies are likely to include life history research into other commercially important species and cooperation with the California Department of Fish and Game in their artificial reef research programs. This latter seeks to address how best artificial reefs can enhance regional fish production. These research areas are of key interest to the California Coastal Commission and the oil and gas industry in their roles of regulating and having to remove structures in deep water. The Pacific Region requires these data and information in order to make informed decisions about potential use of platforms in the future should the State of California adopt a policy to consider abandoning OCS platforms in place on a case-by-case basis.

The effects of high energy acoustic seismic surveys on marine mammals will continue to be a topic of study concern in the Pacific Region in the year 2002 and beyond. The coast of California is one of the richest marine mammal regions in the world and any future oil and gas activities in the Santa Maria Basin will depend heavily on future research done in the Pacific Region and nationally. The HESS team attests to the continued high level of interest in the effects of noise on marine mammals and this interest is now generating research topics which will need to be addressed in the coming years.

The COOGER Study and 1999 Social and Economics Studies conference identified the effect of offshore energy on recreation and tourism as topics of potential research for the Environmental Studies Program in the Pacific Region. Quantitative assessments of recreation and tourism in the area need to be refined and additional research into relationships between these uses and offshore development undertaken as exploration and development occur in the Santa Maria Basin.

Research on the marine natural products potential of organisms that encrust offshore structures may continue depending on the outcome of recently initiated research. Decommissioning research examining the economic and social costs and benefits of alternative disposal options will continue may examine the potential role of decommissioned facilities as sustainable sources of material for marine natural products research.

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Section 2. Study Profiles

Approved Studies

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: Interagency Agreement

Title: Operation of West Coast Ocean Data Buoy Network

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 1999-2002

FY 1999 - $325
FY 2000 - $325
FY 2001 - $325
FY 2002 - $325

Total Cost: $1,300

Conducting Organization: National Data Buoy Center, NOAA

Description:
Background This study continues the support of NOAA=s National Data Buoy Center to maintain three ocean data buoys in the Southern California Planning area. The Pacific OCS Region has provided support for such buoys since 1981. The buoys provide information on wind speed and direction, sea surface temperature, waves, and ocean currents. The data are sent via satellite through the NOAA Argos system and are available in near real time through the NOAA pages on the Internet. Data are archived by NOAA. Presently the three buoys supported by the MMS have been on station for more than ten years for one of the buoys and for several years for the other two.

Objectives Obtain a record of wind conditions in the Southern California Planning Area of sufficient length to provide suitable input for the Oil-Spill Risk Analysis Model (OSRAM). Provide accurate meteorological information (winds, air and sea temperatures, humidity, etc.) for air quality modeling off the Southern California coast. Provide accurate meteorological information for ocean circulation studies being conducted in the Southern California Planning Area for the MMS. Obtain a record of wave data to generate wave climatology in the Southern California Planning Area.

Methods The MMS currently funds three NOAA data buoys along the Southern California Planning Area. These buoys collect a variety of wind and water measurements via the standard NOAA meteorological data equipment.

Importance to MMS This contract is providing the only long-term time series of offshore winds available in the Southern California Planning Area. The wind data have provided extremely valuable information to a variety of air quality, oil-spill, and ocean circulation studies. The information provided is available for oil spill trajectory modeling, and for air quality analyses for post lease plans of exploration and plans of development.

Development of existing leases will require assessment of air-quality impacts, which requires accurate information regarding the near surface wind regimes in the area. Various on-going and planned biological studies will be enhanced by information that will be available only from these buoys , e.g. sea surface temperature, wind and wave conditions, as well as current regimes operating in the channel.

Date Information Required: The data from these buoys is used constantly by ongoing physical oceanography research conducted by Scripps Institution of Oceanography for the MMS. These data will be required through 2002. Exploration and development plans are expected to be submitted by operators beginning in 2000.

Revised Date: 10/24/00

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2002-2003

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: Cooperative Agreement with Options

Title: Santa Barbara Channel-Santa Maria Basin Circulation Study, Phase III: Seasonal Variability of the Circulation Between Point Conception and Point San Luis

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 1998 - 2002

FY 1999 - $262
FY 2000 - $195
FY 2001 - $250
FY 2002 - $250

Total Cost: $957

Conducting Organization: Scripps Institution of Oceanography,
University of California at San Diego

Description:
Background The Phase III study is an extension of the present Cooperative Agreement (no.14-35-0001-30571) with the State of California. Analysis of the data from previous fieldwork is being completed according to the present cooperative agreement, and a full program of field work (supported by this study) is in progress in the SMB to support post lease OCS oil and gas activity in both the SBC and SMB areas.

Objective One purpose of this 5 year study is to determine the frequency and timing of occurrence, and the short term variability of the major circulation processes important to post OCS oil and gas lease decision making discovered in the present Santa Barbara Channel-Santa Maria Basin Circulation (SBC-SMBC), Phase II study. Included in these are the: Davidson Current (affects the transport out of the SBC and onto the California coast north of Pt. Arguello), California Current incursions into the SBC, upwelling north of Pt. Arguello along the SMB shelf, meso-scale eddies in the SMB, on and offshore flows in the SMB, the western SBC cyclonic eddy, and transport through the SBC. All of these time and spatially varying flow processes affect the variation in the biological characteristics of the area, such as the transport of nutrients, fish larvae, plankton, and other biota, as well as the transport of spilled oil.

The other objective is to use this new knowledge to provide appropriate input for the MMS=s oil spill risk analysis and oil spill response efforts.

Methods The field component consists of a two year extension of the array of measurements under the SBC-SMBC, Phase II study. The blending of traditional data analysis and numerical modeling techniques is being coordinated to produce simulated oceanic and wind flows characteristic of the SMB area.

Importance to MMS A much more accurate understanding of the time and spatial variability of the flow processes discovered in the larger field study is necessary to support: (1) the development of synoptic flow fields appropriate for the MMS=s oil spill risk analysis, (2) MMS biological research, and (3) oil spill response efforts conducted by local, state, and federal agencies and the industry. This information will support accurate post-lease decision making and proper mitigation in the SBC and the leases addressed by the COOGER study in the SMB. Information obtained through the Phase III study is required directly (and indirectly in its support of applicable biological research) for the preparation of accurate development and production plans, oil spill contingency plans, environmental assessments, and environmental impact statements which are required and used by county, state and federal agencies.

Date Information Required: Information derived from this study is required for proper planning and decision making concerning increase post lease OCS oil and gas activity scheduled to begin in FY 2000 in the SMB.

Revised Date: 10/24/00

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2002-2003

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: Cooperative Agreement

Title: Analysis of Physical Oceanographic Data Obtained in the Santa Monica-San Pedro Basins

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 1996-2001

FY 1996 - $330
FY 1997 - $120
FY 1998 - $0
FY 1999 - $0
FY 2000 - $0
FY 2001 - $0

Total Cost: $450

Conducting Organization: University of Washington

Description:
Background This data set consists of comprehensive current meter, drifting buoy, meteorological, conductivity, and temperature data obtained in the Santa Monica and San Pedro Basins. MMS is sponsoring the analysis and interpretation of this data in order to yield valuable information regarding oceanic circulation in the Southern California Bight basins adjacent to the Santa Barbara Channel and Southern California coast south of the Channel. It has been established that the circulation in these basins affects the circulation in the Santa Barbara Channel and Santa Maria Basin, the Pacific OCS Region's area of active OCS oil and gas leases. This study has allowed the MMS to reap the results of a $4 million field program for a small fraction of the cost, and enhances the results of the present MMS Cooperative Agreement with the State of California to study oceanic circulation in the Santa Barbara Channel and Santa Maria Basin.

Objectives To analyze and interpret physical oceanographic data obtained in the Department of Energy sponsored ACalifornia Basins Study@.

Methods Special methods and computer techniques required to process these data in the proper computer formats.

Importance to MMS This information will directly support MMS oil and gas regulation interests in

Southern California. The analyses will be used for oil spill trajectory analyses, mud discharge estimates, and produced water dispersion estimates for review of revised development and production plans and oil spill contingency plans. This information will also be used in post-lease decision documents concerning the POCSR area of active OCS oil and gas leases such as development and production plans, oil spill contingency plans, environmental assessments, and environmental impact statements. These improved documents will allow for more accurate post-lease mitigation measures.

Date Information Required: The information from this study is needed by for long range post-lease planning in the southern California Bight and for monitoring present operations.

Revised Date: 10/24/00

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: Cooperative Agreement Options

Title: Santa Barbara Channel-Santa Maria Basin Circulation Study Numerical Modeling Component Extension

Actual Costs (in thousands) **Period of Performance:** FY 1999-2001

FY 1999 - $248
FY 2000 - $352

Total Cost: $600

Conducting Organization: Scripps Institution of Oceanography,
University of California, San Diego

Description:
Background This study is an extension of the numerical modeling circulation component of the Santa Barbara Channel-Santa Maria Basin (SBC-SMB) Circulation Study. The SBC-SMB Circulation Study is the title of the Cooperative Agreement (CA) between the state of California and the MMS. Absence of sufficient observations, as has been the case in past modeling programs, prevents proper model development. One of the Scientific Review Panel=s April 1997 recommendations states that successful SBC-SMB model development, successful analysis of observations, and successful field work is contingent on all three being performed concurrently during the conduct of the SBC-SMB Circulation study. This will allow modelers valuable interaction with the Study=s principal investigators (observationalists) during the conduct of their respective study components.

Recent numerically modeled simulations of circulation processes characteristic to the SBC have been, and continue to be, used in the analysis of observations obtained in that area. Modeled simulations of the characteristic flows of the SBC and SMB appropriate for OSRA, and modeled circulation processes helpful to analysis of the data obtained in the SMB, are not scheduled for completion under the present contract.

Objectives The objectives of the extension of the numerical circulation modeling effort are to (1) support analysis of observations obtained from the extended field work presently taking place in the Santa Maria Basin (SMB) with numerically modeled process studies, and (2) provide reliable predicted ocean current information for the Santa Barbara Channel (SBC) and the SMB by complementing the entire suite of observations obtained in the SBC-SMB Circulation Study. Once

constructed, the SBC-SMB model will aid in the primary form of risk assessment, that is the assessment of probable paths and fates of oil spills in the areas of active leases.

Methods Perceived physical dynamics involved in observed circulation processes will be numerically incorporated in the two PIs respective models of the circulation in the SBC-SMB area. Model runs will be compared to actual observations to assess model accuracy. This iterative process will continue until reasonable accuracy in modeled simulations of surface currents is obtained. Current fields constructed from analysis of observations obtained in the study, combined with dynamical interpolation from the SBC-SMB model, will serve as input to the MMS=s Oil Spill Risk Analysis (OSRA) Model and will aid Pacific OCS Region oil spill contingency planning.

Importance to MMS Enhanced study results (enhanced by modeled process studies) and simulated current patterns from a numerical model will support OCS oil and gas post-lease decisions, including proper mitigation measures, environmental assessments, environmental impact assessments, and other environmental documents associated with post-lease exploration, development, and production in the SMB. This numerical modeling effort will do this directly by enhancing the dynamical integrity of the OSRA model input, and indirectly by its ability to enhance the dynamical description of oceanic processes characteristic to the areas of OCS oil and gas activity. This numerical modeling component is also essential to effectively supporting interagency oil spill contingency planning.

Date Information Required: Information derived from this new modeling effort is required to begin in FY 1999 to allow for continued communication between the SBC-SMB Circulation Study principal investigators and the numerical modelers for the purposes of proper data analysis and proper construction of simulated currents. Results of numerically modeled current simulations will be needed for required OSRA model runs by the end of Fiscal Year 2001.

Revised Date: 9/12/00

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2002-2003

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: Cooperative Agreement

Title: Santa Barbara Channel-Santa Maria Basin Oceanographic Data Support Program for Biological Studies

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 2000-2004

FY 2000 - $1270
FY 2001 - $0
FY 2002 - $229
FY 2003 - $500
FY 2004 - $500

Total Cost: $ 2,499

Conducting Organization: Scripps Institution of Oceanography,
University of California at San Diego

Description:
Background The Santa Barbara Channel-Santa Maria Basin Circulation Study (Circulation Study) provided the background information that is necessary for an operational monitoring program to be successful. Instead of the intensive field work that is normally required, the proposed study can now employ a field program with optimum sites to provide meaningful information for other MMS studies and operations being conducted anywhere in the area of active Pacific OCS Region oil and gas leases. These data can be downloaded both in real-time via ARGOS telemetry and the Internet, and by actual ship recovery of the instruments depending on the needs of the particular research being conducted. Real-time and historical data is presently being made available to the public and Federal, State, and local agencies by way of the Scripps Institution of Oceanography=s Internet web page.

Objectives The primary objective of the Oceanographic Data Support Program is to supply data, in the context of synoptic climactic data obtained from the larger Circulation Study, in support of existing and future biological and long term multi-disciplinary studies conducted in the area of Pacific OCS Region active leases.

Methods The field array will consist of four sparsely instrumented moorings (each with one VMCM current meter); a reserve cache of 25 surface drifters to be deployed in conjunction with important biological cruises and near shore oceanographic research; satellite imagery; at least one cruise per year; and an Internet web page displaying the real time data that will be updated several times daily. It is assumed that the MMS/NDBC meteorological buoy program will support the monitoring program with up to three meteorological buoys placed in the SBC area per the contractor=s instructions**.** These real time data will be used to identify the characteristic flow regime (and its intensity) in the Santa Barbara Channel or the Santa Maria Basin identified in the larger study. This combination of information can then be used to intelligently interpolate surface currents and transmitted to at-sea biological oceanographers or airborne bird and mammal surveyors, depending on the actual location of the research or operations being conducted. Information needs of MMS researchers (contracted and in-house) will be addressed pro-actively in terms of special processing or presentation of satellite imagery and current, wind, temperature, and drifter track data. Surface drifter launches will be initiated based on MMS research needs. Surface drifters can typically be launched on twelve hours notice to measure a particular oceanographic phenomena, or to track currents perceived as affecting biological processes.

Importance to MMS The Biological Resource Division (BRD) of USGS is conducting a seabird and marine mammal study for the MMS in the POCSR=s Southern California Planning Area. One of the goals of this study is to update our existing data on seabird and marine mammal abundance and distribution, most of which is now more than 20 years old. The study examines the underlying factors that may explain the patterns of seabird distribution and abundance off southern California. These factors include oceanographic features (currents, surface temperature, color), meteorological features (wind speed, direction), geographic features (bathymetry, distance to shore, distance to colony), and biological features (chlorophyll, prey density and distribution). By correlating these factors with the observed distribution and abundance of seabird and marine mammal populations, it is hoped that some capability to predict areas of wildlife concentrations will be realized. BRD plans on getting much of this information from MMS offshore buoys and satellite imagery that are part of this proposed Oceanographic Data Support Program. These data can help guide the field surveys by directing observers to oceanographic fronts etc. The historical oceanographic data set will be used in the full analysis of the survey data.

Several ongoing and planned MMS studies deal with the recruitment of marine organisms. These studies include the MMS Intertidal study (MINT), the Santa Maria Basin shorebird/prey study, the Continental Shelf Associates/Ecomar platform invertebrate study, the CMI-UCSB study of intertidal recruitment patterns (Steve Gaines, UCSB), and the CMI-UCSB study on the early development of invertebrate fouling communities on offshore oil platforms. The early life history forms of many sessile marine organisms are planktonic (free-floating) and may remain adrift in the ocean, in some cases for months. During this early period, they are strongly controlled by physical oceanographic processes. Where they eventually settle is also strongly influenced by oceanographic currents. Because of this, high quality current measurements are essential for understanding their patterns of movement and settlement (i.e., recruitment). The studies mentioned above are expected to continue through FY 2001 or 2002 and will use the concurrent data set collected in this

proposed study to help analyze and understand the observed recruitment patterns or factors controlling prey species (for the shore bird study).

The early life history forms of many fish species are planktonic in nature and thus, are also strongly controlled by physical oceanographic processes. Information on oceanographic features is necessary to an understanding of the transport and movement, settlement and recruitment, and overall demographics of many marine fish populations. An example of the type of fish study that uses oceanographic data from the MMS-funded moorings is the MMS/BRD study on rocky reef fish in southern California which will continue into FY 2001. A part of this project focuses on the relationship between water masses associated with the Santa Barbara Channel eddy and juvenile fish populations. UCSB scientists discovered, and are describing, this relationship with input from the oceanographic data provided by the present circulation study. They will continue to benefit directly from real time oceanographic data from the proposed study in that it will be used to guide their larval fish sampling ship cruises.

The Oceanographic Data Support Program is also required to further investigate physical oceanographic processes identified in the larger Circulation Study. The strength, cause, and frequency of occurrence of the Western Jet offshore Pt. Arguello and the anti-cyclonic eddy that forms between Pt. Arguello and Avila Beach, further north along the central California coast, will not be fully determined by the larger Study. Additional monitoring of these phenomena is required to provide adequate data to answer these questions and to address environmental concerns associated with the increasing OCS oil and gas development taking place in the Santa Maria Basin. The proposed Oceanographic Data Support Program will also greatly enhance researcher=s ability to address inter-annual variability in the data collected in the larger Study. This ability is very important to both MMS biological and physical oceanographic research.

This information will directly support the MMS=s immediate oil and gas regulation interests concerning the OCS oil and gas leases in the Santa Barbara Channel-Santa Maria Basin. It will also provide information for future EAs and EISs for DPPs in this area. The existence of this monitoring program helps mitigate environmental concerns held by other Federal and state agencies and the public in regard to the proposed increase in OCS oil and gas activity in the Santa Barbara Channel and the Santa Maria Basin area.

The proposed array of current meters to be deployed in the Santa Barbara Channel and Santa Maria Basin under the proposed Oceanographic Data Support Program is of great value to a number of biological research programs at UCSB and at other institutions. These projects focus on several issues in marine biology, but especially with those studying marine recruitment. For example, a new multi-institutional program just beginning at UCSB, UCSC, Stanford, and Oregon State University (funded by the David and Lucile Packard Foundation) will examine the oceanographic factors controlling the distribution, settlement, and recruitment of fishes and marine invertebrates. Because these organisms are adrift in the ocean during their early life stages, in some cases for months, they are strongly controlled by physical oceanographic processes. The recruitment project will fund limited near shore current measurements. However, the additional offshore data provided by the

proposed current meter array will allow us to trace water movements and the organisms they contain from the deep ocean into coastal reef habitats.

Date Information Required: The Santa Barbara Channel-Santa Maria Basin Oceanographic Data Support Program for Biological Studies should be implemented by the beginning of FY 2000 to minimize the break in time between the field program of the larger study and that of the monitoring program.

Revised Date: 10/24/00

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2002-2003

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: Cooperative Agreement

Title: CMI: Ecological Consequences of Alternative Abandonment Strategies for POCS Offshore Facilities and Implications for Policy Development

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 1996-2001

FY 1996 - $102
FY 1997 - $78
FY 1998 - $75
FY 1999 - $0
FY 2000 - $0
FY 2001 - $0

Total Cost: $ 255

Conducting Organization: University of California at Santa Barbara

Description:
Background Several offshore platforms in Federal waters offshore California are nearing the ends of their useful life cycles and may be removed in the next few years. This has already happened in state waters. The MMS has been actively involved with the State of California in workshops and planning for abandonment of facilities. Scientific questions persist about the utility of offshore structures as artificial reefs and the value of these potential artificial reefs to commercial and sports fishing interests within the state. This research addresses some of the scientific questions focusing on several platforms which may be removed in the near future. Information gained from this research will be coupled with research funded through the MMS and USGS/BRD. Researchers have completed collecting data on fish assemblages around platforms. The final report is due in 2001.

Objectives To determine the role that four platforms in the Santa Barbara Channel play in providing an artificial reef for various species of fish.

Methods Pre and post platform removal surveys of the fish populations around the platforms and at adjacent natural reefs have been conducted by divers and remote sensing equipment. Species composition and size analyses have been completed at the two environments (natural reefs and

platforms) with the goal of correlating these parameters with the presence or absence of the platform.

Importance to MMS The MMS, as a regulatory authority, must insure that OCS facilities abandonments are conducted within existing regulations and that proposed changes to regulations or abandonment practices must be reviewed for their scientific and operational merits. This information is needed by the MMS and other agencies if changes to present abandonment and removal processes and regulations are to be considered for future facilities.

Date Information Required: The results of this research will be used in developing facilities decommissioning options and reviewing decommissioning plans submitted for facilities in California. This activity may occur in the next five to ten years.

Revised Date: 10/12/00

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2002-2003

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: Cooperative Agreement

Title: CMI: Application of Genetic Techniques for Use in Restoration of Surfgrass *(Phyllospadix torreyi)*

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 1999-2001

FY 1999 - $75
FY 2000 - $0
FY 2001 - $0

Total Cost: $75

Conducting Organization: University of California at Santa Barbara

Description:
Background The installation and removal of offshore oil and gas pipelines in California may impact surfgrass beds *(Phyllospadix torreyi*). Because of their great ecological importance, these beds have been designated as environmentally sensitive habitat. Past research has determined the environmental factors that most frequently limit the recovery of the beds after disturbance, identified life stage of the surfgrass most appropriate for reseeding the beds, and tested the feasibility of several different planting techniques. However, the ability to unequivocally describe the genetic variation and other factors of local surfgrass beds has been elusive until very recently. Research commenced in April 1999 and is proceeding on schedule.

Objectives The goal of this study is to find the most genetically successful strain of surfgrass for use in possible mitigation of oil and gas impacts adjacent to or through surfgrass beds.

Methods This study fully describes the mating system of *Phyllospadix torreyi,* isolates genetic markers that are specifically linked to gender, and characterizes the genetic diversity within and among local populations of surfgrass. It employs recently developed techniques of amplified fragment length polymorphism (aflp) for the DNA fingerprinting of local surfgrass beds.

Importance to MMS The information on the genetic composition of surfgrass beds is necessary for the successful mitigation of impacts to surfgrass beds from OCS and other activities.

Date Information Required: The information from this study is not time critical but is necessary for anticipated pipeline decommissioning activities in the next few years.

Revised Date: 10/24/00

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: Interagency Agreement

Title: Santa Maria Basin/Santa Barbara Channel Natural Tar Seep Mapping

Cost Range (in thousands): $280 - $420 **Period of Performance:** FY 2001-2003

Conducting Organization: U.S. Geological Survey

Description:

Background Numerous active natural tar seeps in the area of active Pacific OCS operations release oil into the ocean every day. Some seeps are reported to release upwards of 100 barrels per day. The best source of information documenting and mapping their presence in the Santa Barbara Channel is a report which documents the presence of over 2,000 seeps in State waters in the Santa Barbara Channel alone (State Lands Commission, 1978).

There are no other comparable data for the Santa Maria Basin and no study in the past 20 years in the Santa Barbara Channel.

This type of information is needed to assess possible affects from OCS oil spills. The Platform Irene-to-shore pipeline spill occurred in an area where, based on MINT data, oil seeps are very active and the oil issuing from the seeps often lands on the shoreline. But MMS lacks the information to document how much this natural seepage contributes to the ocean waters. This has been problematic when oil spills from OCS facilities have occurred, for example, during the Torch Platform Irene pipeline spill. Though spill responders and biologists found oil on the shoreline following the spill, it was difficult to determine if its source was Platform Irene, or was from natural seeps. It is believed that a large percentage of the coastline where oil was identified and asserted to be Torch's may actually be from natural seepage or other orphan spills. Impacts on the biota are also not easy to assess because we do not know the normal exposure level in the area. Information about the natural seep volume released in the area, its most likely depositional areas, and exact identification (fingerprinting) are needed to adequately address this problem.

There is insufficient data in the Santa Maria Basin to estimate either the number of seeps, their location or the quantity of seepage. Data in the Channel is sufficiently old to be of questionable value.

Objectives To determine the location, volume, and chemistry of natural tar seeps in the Santa Maria Basin and western Santa Barbara Channel.

Method There are three specific tasks: identification, sampling, analysis.

Identification: We are currently examining geohazard records, biological survey data, and aerial photography records to determine potential seep locations. Inhouse expertise of physical oceanography would also be used to trace potential seep origin based on knowledge of shoreline tar deposition. From this first effort, four or five areas will be targeted for further research. It is expected this effort will be completed Fall 2000.

Sampling: Second, an ROV would be used to sample pre-planned transects in each of the targeted areas to quantify the number and activity of tar seeps. Samples of tar would also be collected. Tarballs would also be collected at key depositional locations along the shoreline for analysis. Selected samples of oil from offshore platforms would also be collected as appropriate.

Analysis: Collected samples of tar and tarballs would be analyzed and fingerprinted by geologists and geochemists at the USGS. This fingerprinting effort would be contracted separately with USGS through a Interagency Agreement since we can obtain quality analysis from their chemical lab at a lower price than competitive. Volumes of gas and oil would be quantified. Shoreline deposits would be mapped in relation to their seep origin. It is possible that this effort could be jointly funded by the Environmental Studies program and TAR (Technical Assessment Research) since TAR is also interested in the fingerprinting aspect of this study.

Importance to MMS The information is needed to assess natural seepage so that OCS operations can be placed in context with the natural environment. This is especially true as regards MMS's responsibility to assess the risk of oil spills in the marine environment compared to the effects of other sources of hydrocarbons. MMS needs to be able to determine the direct impact from our operations, and be able to conclusively determine that oiled areas along the shoreline are or are not from OCS operations.

Date Information Required: The information is needed now and will becoming of increased value as the new oil and gas development projects come into the Santa Maria Basin in 2000.

Revised Date: 10/16/00

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: Competitive

Title: Environmental Mitigation Monitoring

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 1996-2000

FY 1996 - $240
FY 1997 - $180
FY 1998 - $123
FY 1999 - $65
FY 2000 - $122

Total Cost: $730

Conducting Organization: MEC, Inc.

Description:
Background Without demonstrated compliance with mitigation measures and project conditions, it will continue to be difficult for the MMS to have oil and gas operations proceed in a timely manner. The region expects further development of the oil reserves in the Northern Santa Maria Basin and additional drilling has started from existing platforms. Delays for the MMS, industry, and public resource agencies and expenditure of resources could occur without the demonstrated compliance by industry.

A prototype environmental mitigation monitoring database has been developed and populated with historical post-lease mitigation data for approximately the last 10 years. The final effectiveness review report on the MMS post-lease mitigation measures for that same time period has also been submitted. The first task order final report on the vertical seismic profile acoustic propagation study has been submitted. MMS scientists reviewed the second task order draft report on night vision equipment.

Objectives The study consists of three primary phases. Phase I consists of developing environmental mitigation effectiveness criteria and a subsequent environmental monitoring database in a format compliant with the MMS Technical Management System (TIMS). Phase II is proposed as a continuation of this study in FY2001. The phase III study goals are to observe, sample, and/or monitor post-lease OCS oil and gas operations in the Pacific OCS Region to determine

environmental compliance (MMS regulations, Lease Sale Stipulations, National Environmental Policy Act requirements, and non-MMS agency requirements, etc.) with mitigation measures or project conditions and their effectiveness.

Methods Phase I methodology involved convening a Review Panel of Scientists, Academia and MMS scientists to devise appropriate environmental mitigation effectiveness criteria and design and development of a database to evaluate mitigation effectiveness. Phase II methodology consisted of a review of 3 large POCS projects covering a period of 10 years for input into the database to evaluate the effectiveness of post-lease mitigation measures. Phase III methodology consists of field monitoring studies as determined by current MMS projects to observe and monitor the effectiveness of environmental mitigation. Presently in the fourth year of the study, it is in the third phase. Data were analyzed from the field monitoring phase (night-time detection of marine mammals using infrared and light enhancing technologies). Future field monitoring studies in conjunction with Pacific OCS Region projects of opportunity could include additional endangered species detection studies, high energy seismic survey related monitoring, bio-chemical profiling of shell mounds in the vicinity of the platforms and collecting drilling discharges and sediment samples in the vicinity of hard bottom areas. The type of data collected will be determined by Pacific OCS Region environmental management and scientists as specified by the particular project and would depend on the specified approval conditions.

Importance to MMS Environmental compliance monitoring data will be used by the MMS to evaluate mitigation measures and project conditions of post-lease OCS oil and gas operations. In order for the MMS to make better decisions on oil and gas post-lease operations, the agency needs to monitor and observe the operations in the field for environmental mitigation compliance and to determine effectiveness of the measures. Information from environmental mitigation monitoring studies would aid decision makers to develop more feasible and scientifically defensible mitigation measures and project conditions for future oil and gas operations.

Date Information Required: The results of this continuing study will be used for current operations on active leases and future proposed development activities on undeveloped leases. This is expected to begin in the next two years.

Revised Date: 06/05/00

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2002-2003

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: Cooperative Agreement

Title: CMI: Early Development of Fouling Communities on Offshore Oil Platforms

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 1999-2001

FY 1999 - $198

Total Cost: $198

Conducting Organization: University of California at Santa Barbara

Description:

Background The intertidal and subtidal portions of offshore oil platforms provide hard attachment sites for a diverse community of invertebrates. Development of this Afouling community@ can be very extensive with several factors affecting the rate of accumulation. The accumulation can increase the weight load on platform surface members and the frictional drag on the structure, necessitating periodic and costly removal. Furthermore, the dislodging of community members (faunal litterfall) creates a shell mound which may affect community development and provide food and habitat for benthic organisms. Research commenced in April 1999 and is proceeding on schedule.

Objectives (1) To characterize the recruitment and growth of invertebrates onto recently cleaned support members of two platforms; (2) test the effect of several non biological factors on community development; (3) evaluate the importance of early colonizers on recruitment of later species; and (4) determine the relationship between the fouling community and rates of faunal litterfall.

Methods This study uses a number of well established techniques (scrape and recovery, video and photoquadrat surveys, and settling plates) for determining the rates of accumulation and removal of biomass on platforms.

Importance to MMS The information on the composition and rate of growth of biomass on platforms is useful in developing requirements for marine growth removal. Characterization of the process from a clean platform to a functioning ecosystem helps us to understand the value of platforms as marine habitat, and aid in consideration of decommissioning alternatives.

Date Information Required: The information from this study is not time critical.

Revised Date: 10/12/00

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: USGS - Biological Resources Division

Title: The Ecological Role of Natural Reefs and Oil and Gas Platforms on Rocky Reef Fishes in Southern California

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 1995-2000

FY 1995 - $500
FY 1996 - $500
FY 1997 - $500
FY 1998 - $200
FY 1999 - $550
FY 2000 - $375 (10% U.S. Govt., 90% Private Match)

Total Cost: $2,238

Conducting Organization: USGS/BRD

Description:

Background This project builds upon the results of a pilot project (MMS Contract No. 30489) that was conducted during 1990 in the Santa Maria Basin. The Final Report for the pilot project was completed in June 1993. Analysis of 1998 and 1999 field surveys has been completed and an interim technical report has been published. Additional field surveys are being discussed because of the need for greater statistical power and the need to compare additional platform sites. A one-year extension to the ongoing project has been developed and will be managed by BRD.

Objectives The goal of the project is to evaluate the effects of an OCS oil and gas development and production platform on the abundance, species composition, and movements of fishes that inhabit natural, deep-water reefs adjacent to a platform. Important questions that need to be addressed include: Do fish assemblages associated with reefs vary temporally, and/or spatially with proximity to platforms? If changes do occur, are they associated (1) directly with physical (i.e., sedimentological) changes to the reefs, (2) indirectly with changes in the availability of prey species on the reefs as altered by platform discharges, or (3) indirectly because of the availability of new prey and/or shelter beneath the platform?

Methods The sixth year of research builds on the findings of the previous five years. The work will include:1) expanded synthesis of existing information on fishes, particularly rockfishes; 2) continued study of links between oceanography and the distribution and abundance of early life stages of fishes; 3) additional life history studies of fishes in the southern California Bight; 4) description of the spatial and temporal variability of temperate reef fish communities associated with natural reefs, oil/gas production platforms and other artificial structures; and 5) study of fish population dynamics inside and outside a marine reserve

Importance to MMS: Study results will provide answers to the direct and indirect effects of OCS oil and gas production platform operations on rocky reef fisheries (commercial and recreational). Additionally, the study will supply supportive information important for many post-lease decisions, including environmental assessments, environmental impact statements, and other environmental documents associated with plans of exploration, development and production. The effects of OCS production platform operations on rocky reef fish and fisheries continues to be information needed by MMS analysts when they write environmental documents for development plans for the undeveloped leases in Southern California.

Date Information Required: Data from this study has been used in the MMS/California State Lands Commission sponsored Decommissioning Workshop (***Decommission and Removal of Oil and Gas Facilities Offshore California: Recent Experience and Future Deepwater Challenges***). The workshop was held September, 1997. The data will also be used in the future decision-making related to the decommissioning of OCS and State of California oil and gas facilities in the Pacific Region.

Revised Date: 10/23/00

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: USGS – Biological Resources Division

Title: Fisheries Resource Database

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 2000 - 2002

FY 2000 - $74
FY 2001 - $55
FY 2002 - $64

Total Cost: $193

Conducting Organization: USGS/BRD

Description:
Background The Fisheries Resource Database is an update and extension of a previous project to collect and archive commercial and recreational marine fishery data from the coast of California, Oregon, and Washington. The database has not been updated since 1990, and is located on a dated computer system that is not tied into the regional LAN computer system. This study will update the database with current commercial and recreational fisheries data from the southern California planning area. Also, all data will be moved from the OCS Fisheries Resource Database into Oracle so that the database will be compatible with TIMS.

A database that will provide current and historical information of the southern California commercial and recreational fisheries in both tabular and graphic forms will be invaluable to environmental analysis and decision-making. Maps, showing areas of greatest fishing pressure by gear type, along with tables, showing the species fished and its value, can be used by analysts and decision-makers on OCS actions ranging from exploration and development to decommissioning and siting of artificial reefs. Planned exploration and development activities and the recently proposed decommissioning activities offshore California, will require extensive analysis of the commercial fishing industry offshore California and the impacts exploration, development, and decommissioning will have on fishermen.

Objectives The objectives of this study are: (1) to provide a centralized archive of current and historical fish catch data in the southern California planning area that can be easily updated; (2) to

provide a database that will be fully compatible with TIMS; and (3) to provide a convenient tool for retrieving fisheries data in both tabular and graphic form.

Methods The contractor will convert the current database to a TIMS compliant program such as Oracle or ArcView and will update the database with current commercial and recreational fisheries information from California Department of Fish and Game and National Marine Fisheries Service.

Importance to MMS The Fisheries Resource Database will support MMS personnel in their environmental analysis of projects and in the decision-making process. This database will improve the decision-making process through increased internal coordination and involvement of relevant staff since the database will be available to all personnel through the TIMS component. Finally, the database will help streamline the analysis and decision-making process and help ensure the timely preparation of environmental documents with accurate information.

Date Information Required:
This database is needed for proper analysis and decision-making for increased Pacific OCS oil and gas activity scheduled to begin in the next 3 to 5 years in the Santa Maria Basin and Santa Barbara Channel. This will include exploration, development and decommissioning activities.

Revised Date: 10/23/00

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: Competitive

Title: Survey of Invertebrate and Algal Communities on Offshore Oil and Gas Platforms in Southern California

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 1998 - 2000

FY 1998 - $200
FY 1999 - $100
FY 2000 - $110

Total Costs: $410

Conducting Organization: Continental Shelf Associates, Inc.

Description:
Background Data gaps exist with respect to the degree of contribution of invertebrate and algal communities to the general ecology in and around oil and gas platforms in the Pacific OCS Region. Additional information needs must be addressed with respect to comparison of invertebrate species at platforms with those on adjacent natural reefs.

Biological field surveys are being conducted at eight OCS oil and gas platforms in the Santa Barbara Channel and Santa Maria Basin

Objectives The basic study objectives are to (1) conduct biological field surveys of invertebrate and algal communities at selected oil and gas platforms and adjacent natural reefs in the Santa Barbara Channel and Santa Maria Basin, and (2) describe community structure by determining abundance, density, and distribution of these species. The Santa Barbara Channel and Santa Maria Basin are the geographic focus of the proposed survey, since they represent the most concentrated area of oil and gas operations in the POCS. Results from this study will aid the MMS with issues relating to the decommissioning of oil and gas platforms in the Santa Barbara Channel and Santa Maria Basin. Based on the Region=s increased decommissioning activities projected for the near future, this study is vital to the MMS decision-making process.

The specific objectives of the proposed study are as follows:

(1) determine the abundance, density, and depth distribution/vertical zonation of invertebrate and algal communities on selected oil and gas platforms and adjacent natural reefs in the Santa Barbara Channel and Santa Maria Basin;

(2) quantify biomass production estimates of invertebrate and algal communities on selected oil and gas platforms and adjacent natural reefs in the Santa Barbara Channel and Santa Maria Basin;

(3) conduct the proposed research with methodologies similar to or complimentary to those of the ongoing studies being conducted by UCSB (Marine Science Institute); and

(4) make recommendations (based on the study results) to the MMS regarding invertebrate and algal communities on selected oil and gas platforms with respect to future decommissioning activities in the Santa Barbara Channel and Santa Maria Basin and the importance of these organisms to general ecology of the region and local area.

Importance to MMS In the near future, the MMS will require information provided by the study to address issues and make decisions on possible decommissioning and removal of oil and gas platforms in the Santa Barbara Channel and Santa Maria Basin, especially those in deepwater. The study addresses the above with comprehensive surveys of invertebrates and algal communities associated with oil and gas platforms and adjacent natural reefs.

Date Information Required: The data will be used in future decision-making activities associated with the decommissioning of OCS oil and gas platforms in the Pacific Region.

Revised Date: 10/23/00

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: N/A

Title: MMS Intertidal (MINT) Study

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 1998-2003

FY 98: $ 30
FY 99: $ 30
FY 00: $ 20
FY 01: $ 30
FY 02: $ 30
FY 03: $ 30

Total Costs: $170

Conducting Organization: MMS Intertidal Team (MINT)

Description:
Background: The MMS Intertidal Team (MINT) was established in 1992 and has provided efficient and effective monitoring of rocky intertidal communities. Many significant changes have occurred in these communities which could not have been foreseen and which would have been unquantifiable had MINT not collected data when the changes occurred. One such change was the sharp decline of the black abalone. Another change was the complete loss of several square meters of abalone habitat at one site during the El Nino related storms. The mussel recovery study, initiated in 1992 by the MINT team, is soon to be completed as most of the mussel plots are showing signs of recovery.

This monitoring effort is now a part of the larger Multi-Agency Rocky Intertidal Network (MARINE) made up of 14 agencies monitoring 61 sites along the mainland and islands from San Luis Obispo to San Diego. The stated objective of MARINE is: *To quantify the health of the rocky intertidal shoreline biota and the biota that depend upon it for habitat*. The MMS goal of monitoring resources adjacent to ongoing oil and gas activities fits in well with the objectives of the other Federal, State and local agencies who participate in MARINE.

This study, while linked to other rocky intertidal research efforts funded by MMS and others, is specifically designed for the MMS inhouse biology team's efforts. This funding effort allows MMS

biologists to conduct independent research, publish these findings and participate with other biologists in their research.
Objectives: To monitor the health of the rocky intertidal resources in Santa Barbara and Ventura Counties adjacent to OCS oil and gas operations, and to better understand changes observed. To conduct independent but related research projects at these sites to answer specific questions. To guide and refine MMS's broader field efforts through scientific oversight and technical review.

Methods: MMS inhouse biologists and University biologists monitor nine rocky intertidal sites in Santa Barbara County every spring and fall, and provide assistance at two Ventura County sites periodically. Biologists photograph permanent photoplots of mussels, barnacles, and algae species such as *Pelvetia, and Endocladia.* Black abalone are counted and measured in irregular plots, seastars are counted in plots or band transects, percent cover of surfgrass is estimated using line transects, and owl limpets are measured and counted in circular plots. Biologists photograph videotape the entire site using a new protocol developed through the MINT study and take detailed field notes.

Periodic updates, refinements and review of field protocols are part of this effort. As an example, the videotape protocol was reviewed and revised under the previous MINT study in a joint effort by MMS and university biologists. This protocol is also currently being adapted to a new photo technology through MINT funding for use at the sites Fall 1999. It is expected that other such efforts will be required over the duration of this study for the other protocols being used.

New efforts that will be considered over the next few years include:
(1) revising and standardizing field data sheets. These data sheets, in addition, to needing refinement and standardization based on the last 10 years of experience, need to be automated for data efficiency.
(2) comprehensive surveys. More detailed, but less frequent, surveys of the sites are needed to adequately map the habitat. Some of these comprehensive surveys will be randomly placed to enhance our ability to extrapolate to other locations that could be affected by an oil spill.

Costs in FY 00 have been reduced to $20 K, reflecting the fact that staff will have reduced time in the field over this fiscal year, due to inhouse workload priorities.

A new task under this effort will be the conversion of existing MINT data into the format being adopted by the Multi-Agency Rocky Intertidal Network (MARINE). MARINE is currently developing this format; it is expected in the next year. After that all participating agencies will need to convert their data into the new format so that all the data from the 61 sites can be compared and analyzed.

MARINE is currently investigating methods to extrapolate our results to other rocky intertidal locations adjacent to and outside our sites. Another interest is in detecting influx of cold-water species to the sites following 20 years of El Nino conditions. An additional effort being considered to address this is the addition of random transects across the intertidal at our sites and in-between currently monitored areas.

Importance to MMS The OCS Lands Act requires that the MMS monitor the coastline adjacent to ongoing oil and gas operations so that the MMS can properly assess effects on coastline resources. MINT sites are located along the section of coastline where the largest OCS operations exist and the area of continuing expansion of operations.

The data collected by MINT assists spill response decisionmakers by providing information about resources in the area and by providing the ability to analyze the data in context with the natural environment. MINT data was used by the Trustees in the Torch National Resource Damage Assessment to evaluate potential impacts to the rocky intertidal coastline adjacent to Platform Irene. The Government Performance Result Act=s evaluation also depends on the type of information provided by MINT to report on the OCS=s performance in the environment.

MINT allows the MMS to track changes in the communities from both natural and anthropogenic sources. In the absence of such information, natural changes could be attributed to oil and gas activities, and the sensitivity of resources which are actually at risk would not be known.

Ongoing interaction of the MINT team biologists with academics, Santa Barbara County and other agency personnel has proved invaluable. It has enhanced credibility of the MMS as a scientific agency. Some of the most far reaching benefits of the effort may be the enhanced relationships and synergism amongst agencies to analyze data jointly.

Data Information Required: This is an ongoing effort and the decisions are ongoing as long as operations occur off the California coast.

Revised Date: 10/16/00

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: Cooperative Agreement

Title: CMI/Shoreline Rocky Intertidal Monitoring

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 2000

FY 00: $ 157

Total Costs: $157

Conducting Organization: University of California, Santa Barbara
University of California, Santa Cruz
University of California, Los Angeles

Description:
Background This study provides for the monitoring of rocky intertidal sites along the mainland of Southern California adjacent to oil and gas activity. The MMS has been supporting the monitoring of sites in Santa Barbara County since 1991, in San Luis Obispo County since 1995, and in Orange County since 1996.

The scientific community recognizes and supports the continued monitoring of this habitat as it is the best way to detect changes along the shoreline and be alerted to potential problems at an early stage. Since the OCS Lands Act and Amendments requires the MMS to monitor the coastline adjacent to ongoing oil and gas operations, we believe this meets one of the more important goals of the program.

The MMS leverages this effort to the maximum extent. The County of Santa Barbara has matched this study on an almost one to one basis ($189,000) with monies from a State grant based on 8 (g) monies.

This study includes about a third of the total number of monitored sites supported by 14 Federal State, local agencies and private organizations. This network of sites, called the Multi-Agency Rocky Intertidal Network (MARINE) extends from San Luis Obispo to San Diego and includes the offshore islands. The data is being collected in the form of field notes, slides and videotape and is analyzed and placed in a database. It will eventually be made a part of the MARINE database.

Objectives The objective of this effort is to monitor the health of the rocky intertidal habitats adjacent to OCS oil and gas activities in the Pacific Region and to obtain a better understanding of the relationship between changes seen and their potential causes.

Methods Photos, counts and measurements are collected at 4 sites in San Luis Obispo County, 4 sites in Orange County, two sites in Ventura County and 9 sites in Santa Barbara County. MMS biologists assist with collection of data in Santa Barbara and Ventura Counties. Slides are scored and maintained at the respective University campuses, with a CD ROM copy provided to the MMS. University scientists and trained technicians maintain field equipment, write annual and three-year reports and participate in MARINE committees.

Importance to MMS The most recent use of the results of this effort was the National Resource Damage Assessment for the Platform Irene-to-shore pipeline break. Data collected by several MMS funded efforts, including this study and MINT, are being used by the trustees to evaluate impacts from the spill on rocky intertidal resources. The Government Performance Result Act depends also on this information to report on offshore oil and gas's affect on shoreline resources in the event of a spill.

The MMS has greatly benefited from the establishment of these sites in 1991 both in terms of science advancement and understanding of the resources, and in terms of increased networking with other academic institutions. There has been substantial cost sharing with this project through these relationships. Additionally, the MMS now has access to many other studies of interest.

Without ongoing monitoring, one cannot measure the changes experienced in these communities during natural events such as El Nino. Without this type of field knowledge, it is, therefore, extremely difficult to judge OCS oil and gas's contribution to changes in the environment.

Date Information Required:
The value of this effort is to alert the MMS to problems occurring which may result from ongoing oil and gas operations. Additional development is expected in the Santa Maria Basin from about 2005 - 2010.

Revised Date: 10/16/00

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: Sole-source

Title: Shorebirds of the Santa Maria Basin Region: Vulnerability to OCS-related Activities and Accidents

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 1999 - 2002

FY 1999 - $50
FY 2000 - $70
FY 2001 - $70
FY 2002 - $20

Total Cost: $210

Conducting Organization: University of California, Santa Barbara

Description:

Background Many shorebirds use the sandy beaches and rocky shores of the Santa Maria Basin area of southern California (Santa Barbara and San Luis Obispo Counties). However, information on the abundance and distribution of shorebirds in this area is not available. In its review of the OCS Studies Program, the National Research Council (1992) noted a lack of information on coastal bird populations (i.e., shorebirds) and their habitat in the Pacific Region and highlighted the need for long-term studies of bird populations and processes. Shorebirds are vulnerable to the effects of certain OCS-related activities (e.g., pipeline landfalls) and accidents (oil spills). Information on shorebirds would allow for more environmentally sound decisions on the location of onshore facilities and landfalls. This information is important for oil spill contingency planning, damage assessment, and restoration.

Objectives The purpose of the study is to determine the relative abundance, seasonal occurrence, distribution, and species richness of shorebirds occupying the sandy beaches and rocky shores of Santa Barbara and San Luis Obispo Counties, California. In parallel with the shorebird research, a beach characterization and shorebird prey study is being conducted. This aspect of the study will help explain any differences observed in shorebird abundance and species richness.

Methods The study involves monthly counts of shorebirds occupying randomly selected, 1-km long, beaches. In addition to the number and species of shorebirds observed during each monthly

visit, the number of people and dogs are recorded along with an estimate of wave height and period and a sample of sand. At different times during the study, a variety of physical measurements are made and beach and prey samples are taken.

Importance to MMS This is a data gap identified by the National Research Council. Information on shorebird populations will facilitate adequate planning for energy development in the Santa Maria Basin. Post-lease construction schedules, development of active leases, and operation of onshore support activities are all potentially affected by the presence of endangered or threatened birds, such as the western snowy plover (*Charadrius alexandrinus nivosus*). Information from this study also supports decision making during oil spill response operations, enabling biologists and managers to deploy cleanup and protective equipment more precisely, predict probable impacts on shorebirds in affected areas, and improve damage assessment. The MMS needs these data to develop environmentally sound operations, and this information is necessary to insure that both operators and MMS develop appropriate mitigation to protect birds. Decisions regarding the protection of birds are subject to the National Environmental Policy Act, the Endangered Species Act, the Migratory Bird Treaty Act, and the OCS Lands Act.

Date Information Required: This information is needed in conjunction with major development activities, such as construction of onshore facilities, or pipeline landfalls on the coastlines of Santa Barbara and/or San Luis Obispo Counties. Development plans are expected to be submitted for leases in these areas in the next three to five years and the information from this study would be used to help prepare environmental reports (EIS-s and EA-s) on these plans.

Revised Date: 10/16/00

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: USGS - Biological Resources Division

Title: Marine Mammal and Seabird Surveys of the Southern California Planning Area.

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 1999 - 2001

FY 1999 - $325
FY 2000 - $325
FY 2001 - $325

Total Cost: $975

Conducting Organization: USGS/BRD

Description:
Background Although this region was previously surveyed in 1975-78 and 1980-83, the data collected during these studies are now 15 to more than 20 years old. The increased urbanization of the coast and use of the ocean, the occurrence of major El Niño, La Nina, and PDO (Pacific Decadal Occilation) oceanographic events, and the documented changes in certain marine mammal and seabird populations that have occurred since that time all provide reasons for conducting a new survey of the area.

The marine mammal and seabird data upon which the MMS relies are aging. Depending on the extent to which increasing industrialization and urbanization and the occurrence of biological and physical phenomena in the region have caused marine mammal and seabird populations to vary in abundance and distribution, operational decisions based on these old data may be in error. The recovery of the California gray whale population and its removal from the list of federally endangered species provide a recent example of the usefulness of accurate population monitoring to offshore industry.

Objectives The purpose of the study is to determine the relative abundance, seasonal occurrence, and distribution of marine mammals and seabirds occupying the offshore waters of the Southern California Planning Area.

Methods This study surveys marine mammal and seabird populations in the Southern California Planning Area, where OCS oil and gas activities are currently occurring. Surveys are being conducted by aircraft at regular intervals over a 3-year period in an area extending from just south of Monterey County to the Mexican border and out from approximately 40 to 100 nautical miles from the shoreline.

Importance to MMS Post-lease construction schedules, development of active leases, and operation of offshore support activities from onshore facilities are all potentially affected by the presence of marine mammals and endangered or threatened seabirds. Old data do not adequately support MMS decisions on post-lease development or operation plans.

Date Information Required: Development plans are expected to be submitted for leases in the Southern California Planning Area in the next three to five years, and the information from this study would be used to help prepare environmental documents (EIS=s and EA=s) on these plans.

Revised Date: 10/16/00

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: Cooperative Agreement

Title: Southern California Coastal Recreation Inventory and Valuation

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 2000 - 2001

FY 2000 - $126
FY 2001 - $235

Total Cost: $491

Conducting Organization: University of California, Berkley

Description:
Background: Potential effects to coastal recreation from energy development in the OCS and state waters may occur in three ways.

- o short-term effects from offshore development activity such as beach or campground closures due to offshore to onshore pipeline construction.
- o long-term effects from the presence of offshore infrastructure such as processing facilities and offshore oil platforms which may change use patterns.
- o short and long term effects of an oil spill which may change use patterns.

Yet, offshore energy operations are not the only factors that potentially affect coastal recreation. For example, the changing physical characteristics of the beach through beach erosion, water quality degradation from non-point sources and changing consumer preferences may also lead to short-term and long-term changes in use patterns. Whatever the cause, changes in coastal tourism and recreation patterns may have very pronounced and localized effects on communities. Currently, the State of California is developing a general model for valuing beach recreation based on a study of Los Angeles and Orange Counties, California (hereafter referred to as the LAOC study). That effort is accomplished through a cooperative agreement between a number of state and federal agencies. The culmination of the LAOC study is a system for the use by State Water Resources Control Board staff and other state agencies to estimate the public value of any beach in the region using attributes of that particular beach.

Objectives: The study enhances the state=s system by extending it to the Tri-counties (Ventura, Santa Barbara and San Luis Obispo), replicating the methodology, to the extent possible, used in LAOC study. It will create a computer program that estimates the value of beach recreation for a given location and how this value may be affected by characteristics of the location. These characteristics encompass a number of factors such as recreational opportunities (water-dependant and water-enhanced) at the site, the amenities (parking, concessions, lifeguard services), physical characteristics of the site (water quality, proximity to industrial facilities, beach erosion), distance from the urban areas, and other factors. This value can then be used to accurately estimate the potential impacts when a site is affected by a number of sources, including those from offshore oil and gas activities.

Method: Survey of area residents using established social science methodology (screener survey to develop list of respondents who then keep diaries of beach recreation activities), literature survey for beach attributes with on-site verification, and archival research for beach attendance data.

Importance to MMS: The Pacific OCS Region=s ALong-Range Planning for Environmental Studies@ document (1997) identified tourism and recreation as a topic that was in need of further study. This issue was also identified in the National Research Council=s AAssessment of the U.S. Outer Continental Shelf Environmental Studies Program@ (1992). The information the MMS has on tourism and recreation amenities is somewhat dated. In the next few years, the region will require this information to support a number of decisions. The proposed study is a regional level analysis baseline study which provides the very detailed information needed for future development and production decisions. Also, the resource-use and mitigation aspects of the study provide the highly detailed information needed for the entire range of OCS decisions. (See Table I--Social Science Data Needs for OCS Decision Points in the Final Draft of AApplied Social Science in : A Framework for Decisionmaking.@) Moreover, the study will suggest mitigation measures which can be applied throughout the entire range of OCS decision making. The methodology analysis will ensure that the MMS uses the most valid and reliable method for a given set of circumstances. The resulting database provides a common data set for subsequent analyses by local, state, and federal agencies.

Date Information is Required: Decisions that this information will support are expected to start in the next three to five years.

Revised Date: 10/01/00

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2002-2003

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: Cooperative Agreement

Title: CMI: The Political Economy of Rigs-to-Reef Option for Decommissioning of Offshore Oil and Gas Structures

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 1999-2000

FY 1999 - $115
FY 2000 - $ 0

Total Cost: $115

Conducting Organization: University of California, Santa Barbara

Description:
Background Decommissioning of OCS oil and gas platforms in the Pacific Region is a relatively new challenge. Options other than complete removal have not been fully explored. The MMS and California State Lands Commission sponsored Decommissioning Workshop and follow-up interagency meetings identified a number of policy issues that should be examined. Studies should be undertaken as the next step in the process. For example, a growing body of literature examines the recreational and other uses of active and decommissioned offshore platforms as artificial reef sites. However, most of this literature has focused on areas other than the Pacific OCS. Research commenced in April 1999 and is proceeding on schedule.

Objectives This study involves 1) examining the costs and benefits of decommissioning alternatives for offshore platforms, 2) evaluating state rigs-to-reef programs on the basis of three criteria: (a) effectiveness of the statutory basis of the program, (b) allocation of the costs and benefits of decommissioning options, and (c) the role of ecological restoration in a rigs-to-reef programs.

Methods This study uses a number of social science methods including case studies, analysis of archival data, elite interviews, and policy analysis.

Importance to MMS The study illustrates the alternatives available for converting OCS platforms to some other use as part of an economically rational, environmentally beneficial decommissioning strategy. The study supports the Region=s interests in decommissioning.

Date Information Required: Decommissioning of OCS facilities is expected in the next few years.

Since this study examines policy alternatives, it must be undertaken prior to decommissioning if any of the alternatives has a reasonable chance of being implemented.

Revised Date: 10/24/00

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2002-2003

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: Cooperative Agreement

Title: CMI: A Design for a Time Series Study of a NIMBY Response

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 1999 - 2000

FY 1999 - $41
FY 2000 - $0

Total Cost: $41

Conducting Organization: University of California, Santa Barbara

Description:
Background Understanding risk and the public=s perception of risk has been a recommendation of the various National Research Council reviews of the MMS study program and special workshops held in the Pacific OCS Region to plan a socioeconomic research program. The first effort made in the region to study the perception of the public toward offshore oil development and energy issues in general was an analysis of public opinion surveys conducted over several decades. The next phase in understanding risk perception was to couple an investigation of public perception of risk with public trust in a variety of sources of knowledge. This work builds on previous MMS-sponsored research which includes the characterization of public opinion over time regarding offshore development in California. This past work has revealed important factors that influence the design of MMS risk communication.

Objectives The project essentially develops the framework for a time series study of the not-in-my-backyard (NIMBY) effect, prevalent in the environmental literature. The study explores the hypothesis that a development motivates a small group of people in proximity to the development to become active and organize to resist the proposal. However, as distance from the event increases (in some cases perhaps by a city block), people's perception and hence their motivation to resist decreases. This hypothesis is consistent with the "distance decay" phenomena described by political geographers.

Methods Literature search to create and refine the survey instrument, question formulation, creation and pre-test of the instrument for face validity and reliability.

Importance to MMS Risk perception and public trust are both key issues related to offshore oil and gas activities. Understanding the public=s perception of risk and the avenues by which the public

and other interest groups receive information that they trust is required in order for the MMS to communicate more effectively with other agencies and groups. Although the results of this study do not affect a specific decision, the results may well affect all decisions if better communication occurs as a result of better understanding by the MMS of the public=s perception of risk.

Date Information Required: This study is applied research to assist the MMS in developing risk communication. As such, the information is not tied to a specific event. However, the likelihood of additional development in the Santa Maria Basin in the next three years does frame the time for the usefulness of information.

Revised Date: 10/24/00

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2002-2003

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: Cooperative Agreement

Title: Coastal Marine Institute (CMI)

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 2000 - 2004

FY 2000 - $1,000
FY 2001 - $1,000
FY 2002 - $1,000
FY 2003 - $1,000
FY 2004 - $1,000

Total Cost: $5,000

Conducting Organization: University of California, Santa Barbara

Description:
Background The Southern California Educational Initiative (SCEI) and Coastal Marine Institute (CMI) were initiated in 1989 and 1994, respectively, as a cooperative research and research training program between the Minerals Management Service, the State of California, and the University of California. The focus of the university-based programs is the study of the long-term environmental, economic and social consequences of oil and gas production in the Pacific Outer Continental Shelf region. The CMI arrangement provides a pool of research funds whereby the MMS contribution is matched dollar for dollar. The SCEI program, which was renewed for a second five-year period in FY 1996, does not have the matching funds requirement. The funding for the two programs expired at the end of FY 1999.

The Pacific OCS Region recently signed a cooperative agreement with the University of California Santa Barbara to extend the Coastal Marine Institute program between the MMS and the University for another five years. This agreement continues to build on a foundation started about ten years ago MMS began looking for opportunities to strengthen relationships with States where OCS oil and gas activities take place, and improve the credibility and use of environmental research conducted by outside parties for the Agency. The Coastal Marine Institute (CMI) initiative was developed to meet these concerns. The CMI initiative was proposed in 1991 as a Federal-State partnership and first implemented as a component of the MMS Environmental Studies Program in FY 1992. Through this initiative, the MMS has successfully forged partnerships and strengthened relationships with the university community and States.

MMS and the individual states have distinct but complementary roles in the decision making process and scientific information is needed by MMS, the states, and localities potentially affected by resource exploration and extraction on the outer continental shelf. In recognition of the mutual benefits of the research, federal funds provided through the CMI must be matched by the State through its recipient institution.

The studies and activities funded under the first year of the new agreement include

1. Inventory of Rocky Intertidal Resources in Orange, Los Angeles, Venture, Santa Barbara, and San Luis Obispo Counties.
2. Population Dynamics and Biology of the California Sea Otter at the Southern End of its Range
3. Population Genetics of Surfgrass for use in Restoration
4. Habitat Value of Shell Mounds to Ecologically and Commercially Important Benthic Species
5. Public Perceptions of Risk Associated with Offshore Oil Development
6. Observing the Surface Circulation Along the South-Central California Coast Using High Frequency Radar: Consequences for Larval and Pollutant Dispersal
7. A special study under the CMI, Advancing Marine Biotechnology: Use of OCS Oil Platforms as Sustainable Sources of Marine Natural Products.
8. Continuation of the highly successful internship program.

Objectives The purpose of the program is to provide the MMS with high-quality, peer-reviewed studies of the effects of OCS development and to use the CMI as a vehicle to leverage available MMS funds.

Methods The MMS identifies research needs and invites university-affiliated researchers to submit proposals that address the needs. The proposals are peer-evaluated, ranked, and forwarded to the MMS for further evaluation and action.

Importance to MMS The programs serve the mission of the MMS in a number of ways. It provides the Service with a pool of high-quality research talent in a number of areas. The arrangement facilitates a multi-disciplinary approach to research. The programs allow the flexibility to study unanticipated problems as they occur. The modest funding level of most projects allows the MMS to efficiently sponsor needed research that might not be possible under traditional competitive procurements. A major component of the program is the training of researchers and interns under the supervision of the principal investigator(s) for each project funded by CMI.

Date Information Required: The information will be generated in response to requests. It will become of increased value as the new oil and gas development projects come into the Santa Maria Basin in 2000.

Revised Date: 10/24/00

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2002-2003

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: Cooperative Agreement

Title: CMI: Program Management

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 2000 – 2004

FY 2000 - $102
FY 2001 - TBD
FY 2002 - TBD
FY 2003 - TBD
FY 2004 - TBD

Total Cost: TBD

Conducting Organization: University of California, Santa Barbara

Description:
Background This is the management portion of the Southern California Educational Initiative. Management has been and continues to be a significant requirement of the cooperative agreement. Although this element of the cooperative agreement is not truly a research effort, it is a necessary basis for the success of the scientific work. Regular quarterly reports and annual reports have been filed with the COTR and headquarters for this cooperative agreement since its beginning.

Objectives To insure a smooth operation and timely delivery of high quality science to the MMS and the University.

Importance to MMS Management of the CMI is required by the University and is an integral part of any multi-task element cooperative program.

Date Information Required: This does not apply to this element.

Revised Date: 10/12/00

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2002-2003

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: Cooperative Agreement

Title: CMI: Joint UCSB-MMS Pacific OCS Student Internship and Trainee Program

Estimated/Actual Costs (in thousands) **Period of Performance:** FY 2000-2004

FY 2000 - $39
FY 2001 - $39
FY 2002 - TBD
FY 2003 - TBD
FY 2004 - TBD

Total Cost: TBD

Conducting Organization: University of California, Santa Barbara

Description:
Background The Pacific OCS Region has had need from time to time of short term scientific assistance in gathering and analyzing data and information for use in environmental and other documents. In addition, one of the principle objectives of the Environmental Studies Program is to disseminate information collected by research funded by the agency. These two needs can be partially satisfied through the use of student interns from the University. Furthermore, it has been a standing recommendation from the OCS Scientific Committee that the MMS institute an intern program so as to provide a long term benefit to the agency and the public.

At this writing, interns have developed an NPDES discharge database for the Pacific Region, helped develop and enter data into the Coastal Bird Surveys conducted by MMS scientists, worked on the geological interpretation of faulting in the Southern California Bight, and are presently developing GIS maps for the MMS in partnership with Santa Barbara County to map fishing hazards in three areas in the Santa Barbara Channel. Additional interns are working on a water quality database, intertidal literature search, platform/facilities decommissioning database, updating a taxonomic atlas (with the Santa Barbara Museum of Natural History), an helping to collect beach attendance data.

Objectives The objectives of the Intern Program with the University of California Santa Barbara are to target specific topics with which the MMS could use the help of an intern and at the same

time provide for a program to acquaint the student with the wide diversity of the programs and actions of the Pacific OCS Region. Thus, students are trained in a real regulatory environment giving them skills to use once they move into a career path. The Pacific Region and the MMS benefit from creating a potential future pool of professionals familiar with the mission and practices of the agency.

Methods The MMS identifies topics annually for which interns are appropriate. The University has a regular selection process for interns and the MMS office requesting an intern selects and mentors the student intern for periods of up to one year..

Importance to MMS It is highly desireable that Pacific OCS Region is disseminates information to as wide an audience as possible. It is also desireable that the widest possible audience be familiar with the mission and processes of the agency, both to provide informed decision making outside of the Federal sector and to provide a pool of talented and trained professionals for future recruitment.

Date Information Required: The work of the interns varies by Intern and the type of project. Usually the work products of the interns are delivered to the MMS within 3 to 6 months after the intern begins a project.

Revised Date: 10/12/00

Proposed Studies

Region: Pacific Region

Planning Area(s): Southern California

Type: N/A

Title: A Literature Review of the Effects of Oil Spills on Marine Biota with Emphasis on West Coast Species

Cost Range (in thousands): $50 - $100 **Period of Performance:** FY 2002

Description:

Background. The potential effects of oil spills on marine biota have been extensively studied and reviewed. In 1985, the National Research Council (NRC) published AOil in the Sea@, an extensive compendium of the effects of oil spills. There have been several major spills since that time (e.g., AMERICAN TRADER, EXXON VALDEZ), and the NRC is updating the 1985 edition of the Oil in the Sea report. The NRC report scope is global in coverage and a more focused analysis of oil spill effects on Pacific Coast habitats and species is required by the Pacific Region for future environmental documents.

Objectives. To review recent scientific publications and technical reports (i.e., Agray literature@) on the effects of oil spills on marine biota and write a synthesis of recent research. The focus is on west coast species including invertebrates, algae, fishes, marine mammals and birds.

Method. Use computer and library searches for relevant documents. The synthesis will be written in Aplain language@ and it will be used in National Environmental Policy Act documents prepared by the MMS.

Importance to MMS. With the increasing interest of industry in exploring and developing the offshore oil and gas resources on their existing leases in the Southern California portion of the Pacific OCS Region, the Region needs an up to date review of oil spill effects in their environmental documents. It is anticipated the Region will use the proposed study as an appendix to Environmental Assessments and Environmental Impact Statements that will cover exploration and development. Since it is expected that the report will undergo rigorous public review, it is necessary that the review cover the most recent research and be prepared by scientifically respected experts in the field of oil spill effects on marine biota. This review will not only be invaluable to the MMS, but also the oil spill response community. The National Oceanic and Atmospheric Administration (NOAA), California Office of Oil Spill Prevention and Response (OSPR), and trustee agencies such as the Fish and Wildlife Service would not only be able to use this review in

their Natural Resource Damage Assessments (NRDA), but could be available for a potential funding partnership with the MMS.

Date Information Required: Since proposals for future exploration and development will be submitted starting in FY2000, the information acquired from this study would be immediately useful for inclusion in environmental documents and determination of mitigation. The NRC update of Oil in the Sea will not provide the timely site specific information the Region requires.

Revised Date: 10/24/00

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: N/A

Title: Monitoring Assessment of Long-term Changes in Biological Communities in the Santa Maria Basin: Phase IV

Cost Range (in thousands): $1,600 - $2,400 **Period of Performance:** FY 2002 - 2006

Description:

Background: The CAMP study was started in 1984 as an effort to study long-term effects of drilling and production activities in the Santa Maria Basin, primarily in the area of the Pt. Arguello Field development project and one proposed for Lease OCS-P 0409, the site of a proposed but not installed platform. The Santa Maria Basin is the location for many of the Region=s undeveloped leases. The MMS anticipates receiving development and production plans for several projects within the next few years.

The long-term effects of OCS production platforms on hard-bottom and soft-bottom biological communities continue to be an issue among the resource permitting agencies, fishing industry, scientific community, and the general public. Research results will guide the MMS with respect to program decisions and future cumulative effects of oil and gas drilling operations in the Santa Maria Basin.

Objectives: The objectives of the study are to continue researching potential long-term effects of drilling and production operations (e.g., platform discharges) on biological communities in the Santa Maria Basin in the vicinity of Platforms Harvest, Hermosa and Hidalgo, and in the northern Santa Maria Basin. Phase IV focuses additional research on biological and chemical processes of offshore drilling activities on various benthic communities to determine changes due to natural variability and/or chronic low-level cumulative effects.

Method: Two to three field survey cruises to: 1. Conduct chemical burden analyses for selected benthic species; 2. Perform additional settlement and larval experiments on sensitive benthic species; 3. Conduct growth rates experiments on benthic species within proximity of platform discharges; and 4. Sample the soft-bottom habitat at selected platform sites by collecting box core samples for hydrocarbon and trace metal chemistry (including barium), sedimentological analyses, and benthic infauna (last sample taken at the Lease 0409 site was May 1989).

Importance to MMS: Information disseminated from the proposed research will aid the MMS with permitting oil and gas development and production projects in the Santa Maria Basin. Additionally, study results would be used to enable the MMS to make more informed, scientifically defensible decisions on future post-lease issues with respect to preparation of required National Environmental Policy Act (NEPA) documents, such as environmental impact statements, environmental assessments, and records of decision. Development of effective mitigation measures would also be enhanced by study results. Monitoring of Platforms Harvest, Hermosa, and Hidalgo is part of the MMS record of decision in approving these development projects.

Product: Final and Yearly Progress Reports, Databases, Video Tapes, Photographs

Date Information Required: The permitting process for development projects could start in the next three to five years. Commencement of the study now will allow the study period to encompass much of the upcoming activity, and build on the significant work already conducted in this area under the CAMP Phases I, II and III projects.

Revised Date: 10/24/00

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2002-2003

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: N/A

Title: Environmental Mitigation Monitoring

Cost Range (in thousands) $400 - $600 **Period of Performance:** FY 2001 – 2003

Description:

Background Without demonstrated compliance with mitigation measures and project conditions, it will continue to be difficult for the MMS to have oil and gas operations proceed in a timely manner. The region expects further development of the oil reserves in the Northern Santa Maria Basin and additional drilling has started from existing platforms. Delays for the MMS, industry, and public resource agencies and expenditure of resources could occur without the demonstrated compliance by industry.

This study is a continuation of the field analysis segment of an earlier 4-year study of the same title which occurred between 1997 and 2000. In that study, a prototype environmental mitigation monitoring database was developed and populated with historical post-lease mitigation data for approximately the last 10 years. The final effectiveness review report on MMS post-lease mitigation measures for that same time period has also been submitted. Database user training has been developed and completed in mid-summer 1999. The first task order final report on the vertical seismic profile acoustic propagation study has been submitted. The second task order final report on the night time detection of marine mammals study has been submitted. A third task order for a study of the physical and chemical characteristics of OCS shell mounds has been approved and the study has commenced.

Objectives The study goals are to observe, sample, and/or monitor post-lease OCS oil and gas operations in the Pacific OCS Region to determine environmental compliance (MMS regulations, Lease Sale Stipulations, National Environmental Policy Act requirements, and non-MMS agency requirements, etc.) with mitigation measures or project conditions and their effectiveness.

Methods We are proposing a new study for an additional three years to acquire mitigation effectiveness data on the exploration plans recently submitted and other post-lease operations. Methodology consists of actual mitigation monitoring to determine the environmental effectiveness of mitigation placed upon projects to determine the most effective and resource protecting mitigation. Examples of future field monitoring studies in conjunction with Pacific OCS Region projects of opportunity could include, 1) additional endangered species detection studies to ensure

compliance with the Endangered Species Act, 2) high energy seismic survey related monitoring to ensure compliance with project conditions, 3)bio-chemical profiling of shell mounds in the vicinity of the platforms to determine the feasibility of deep water compliance with debris removal, and 4)collecting drilling discharges and sediment transport samples in the vicinity of hardbottom areas to determine compliance with mitigations to protect those resources. The type of data collected will be determined by Pacific OCS Region environmental management and scientists as specified by the particular project and would depend on the specified approval conditions.

Importance to MMS Environmental compliance monitoring data would be used by the MMS to evaluate mitigation measures and project conditions of post-lease OCS oil and gas operations. In order for the MMS to make better decisions on oil and gas post-lease operations, the agency needs to monitor and observe the operations in the field for environmental mitigation compliance and to determine effectiveness of the measures. Information from environmental mitigation monitoring studies would aid decision makers to develop more feasible and scientifically defensible mitigation measures and project conditions for future oil and gas operations.

Date Information Required: The results of this continuing study will be used for current operations on active leases and future proposed development activities on undeveloped leases. This is expected to begin in the next two years.

Revised Date: 10/24/00

Region: Pacific Region

Planning Area(s): Southern California

Type: N/A

Title: Pre- and Post-exploration and Development Monitoring of Sensitive Hard Bottom Habitats in the Santa Barbara Channel

Cost Range (in thousands): $1,200 - $1,800 **Period of Performance:** FY 2002-2005

Description:

Background Exploratory activities in the Pacific Region are anticipated to begin about calendar year 2002. In particular, operators of the Gato Canyon Unit may drill one delineation well in Lease OCS-P 0460, the northern most lease in the Unit. Hard bottom features with known sensitive communities exist in the northern one-third of the lease. In 1984, SAIC conducted Phase I of the MMS Environmental Study entitled, A Assessment of Long-term Changes in Biological Communities in the Santa Maria Basin and Santa Barbara Channel.@ Part of this study entailed surveying potential hard bottom areas spread from the Channel to the northern Santa Maria Basin. The first area surveyed was in the Gato Canyon Unit on Lease 0460 and included two east-to-west transects. These transects found hard bottom in about a 50:50 ratio with soft bottom. That is, the hard bottom was not continuous and, in some cases, was very patchy and low relief (less than 1 meter); the highest relief seen was about 2 feet. The biological community consisted of solitary species of cup corals, soft corals, some fluted and vase-shaped varieties of sponges, several bryozoan species and *Telia*-like sea anemones. Many juvenile rockfish were present as well as black-eyed gobies. The depth range for the transects ranged from 245 to 260 feet.

Another environmental study conducted by the MMS was completed in 1995. Entitled, ADisturbance of Deep-Water Reef Communities by Exploratory Oil and Gas Operations in the Santa Maria Basin and Santa Barbara Channel@, its purpose was to determine if historical exploratory operations had created a detectable and lasting impact to hard bottom areas near these well sites. As a part of this study Lease 0460 was surveyed using sidescan sonar but not selected for visual surveying.

CAMP, Phases II and III determined that little detectable changes occurred to hard bottom communities from drilling-related discharges. This study was somewhat confounded by the unexpected timing of the installation of the platforms involved in the CAMP study as well as the unexpected start up of the discharge of produced water. CAMP was conducted in a deep water environment. This proposed study site ranges in water depth from approximately 200 to 400 feet and is closer to shore. However, little is known about the specifics of the hard bottom communities

within the Gato Canyon Unit and less is known about potential effects of discharges in the high energy, nearshore environmental of the Gato Canyon area.

Objectives
1. Using existing data (visual and sidescan sonar), as well as any additional information the operator may collect (for example, additional sidescan sonar or qualitative biological surveying), determine the most sensitive communities existing within 1,000 meters of the exploratory well.
2. Document changes in the hard bottom communities and determine if these changes are due to drilling-related discharges, or some other anthropomorphic or natural cause.

Methods
1. Remotely Operated Vehicle or manned submersible using underwater still and video cameras, laser ranging systems (for quantifying the still photography), manipulator claw for gathering samples.
2. Quantitative photoquadrat and video analysis of key members of the hard bottom community, focusing on long-lived and sensitive-to-sedimentation species such as sponges, bryozoans and soft corals.
3. Analysis of the collected still and video media using point-contact or equivalent methods and statistical analyses using standard methods that will reveal similarities and differences spatially and temporally.

Importance to MMS Knowing the long-term effects of drilling and production-related discharges in this new and decidedly different environmental regime would help the MMS better understand the effects on this habitat and to reply to criticisms regarding these discharges.

Date Information Required:
The pre-exploratory survey must occur before exploration drilling occurs. Other parts of the study must be coordinated with the exploratory drilling process.

Revised Date: 10/16/00

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: N/A

Title: Mussel Bed Restoration Project

Cost Range (in thousands): $175 - $250 **Period of Performance:** FY 2002 - 2004

Description:

Background Mussel beds in the northern Santa Barbara County and elsewhere in the Southern California Bight have been declining for the past several years. Monitoring of sites in Santa Barbara County has identified a downward trend in mussels in fixed plots at many sites, despite continued larval recruitment. Significant decreases in mussels were seen following the El Nino at several sites in San Luis Obispo and Santa Barbara Counties (MMS,1999). These natural declines, coupled with anthropogenic effects such as public harvesting, development activities and oil spills, provide reason for concern given the importance of this habitat to the coastal environment.

We know through research that mussel beds require significant periods of time to recover from a major disturbance (Kinnetics, 1991 and MMS/Kinnetics, 1999). Complete destruction of intertidal mussel beds, as from a construction activity, may result in an impact lasting decades. This is in contrast to the relatively rapid colonization of piers and platform legs. A different mussel, *Mytilus galloprovencialis*, is responsible for the more rapid colonization. *Mytilus californianus* is the species found to predominate in mature rocky intertidal mussel beds and on mature oil platform leg communities where cleaning of the legs was not done.

Based on preliminary conclusions from the MMS MINT 12 year mussel recovery study in Northern and Central California, it appears that once a threshold of cover is reached in the plot, the recovery rate increases. It is believed that by starting with 30% cover of mussels, one might be able to shorten the overall recovery time by 6-7 years.

We currently know that mussel beds require many years**B**upwards of 10-20 years to recover. There is to our knowledge no good information available on field methods used to accelerate recovery of mussel beds. NOAA recently sponsored a white paper on the state of mussel beds in Southern California which identified an overall concern about the decline in mussel beds in the Southern California Bight.

Objectives The goal of this restoration study would be to find and test methods which are likely to accelerate the recovery of mature mussel beds. Different transplant methods believed to accelerate

mussel bed recovery will be field tested and monitored to determine overall the most beneficial approach

Methods Three sites on Vandenburg AFB (Santa Barbara County) would be identified and locations for study plots established in areas where mussel beds are receding. Experimental fixed one-meter square plots would be established along the perimeters of the beds and Aseeded@ by laying small patches of adult mussel on the substrate and adhering them with burlap cloth and bolts. Control plots would be established in healthy portions of the mussel beds.

Instead of taking mussels from other mussel beds along the coast and risk damaging otherwise healthy beds, adult mussels of the species *Mytilus californianus* would be carefully collected from an offshore platform at minimal cost. A genetics/health analysis would be performed to ensure that the mussels being used for the transplant do not introduce unwanted elements.

In addition to the transplanted mussels, within experimental fixed plot areas additional techniques would be tested to determine which are the most beneficial. These might include removing Aundesirable@ plants and animals (those thought to hinder mussel recruitment) prior to the transplant, or altering the total mussel transplant cover in specific plots. Additional enhancements, such as adding artificial substrate, will also be tried in an effort to accelerate normal recovery.

The plots would be carefully monitored, frequently at first, and then at least biannually over time using an approach which would lend itself to comparison with the 12 year MMS MINT mussel recovery study.

Importance to MMS In anticipation of shoreline impacts which may be caused by oil and gas development in the Santa Maria Basin due to increased activity, the MMS needs to be proactive in developing methods to restore the habitat to its original condition. Such methods require time and field experimentation.

Date Information Required: Data would be useful at any time, and could be required when the next oil spill occurred.

Revised Date: 10/24/00

Region: Pacific OCS Region

Planning Area: Southern California

Type: N/A

Title: The Habitat Value of Oil and Gas Platforms in the Santa Maria Basin and Santa Barbara Channel

Cost Range (in thousands): $140 - $210 **Period of Performance:** FY 2001 - 2002

Description:

Background The habitat value of 9 platforms on the Pacific OCS was determined under OCS Study MMS 99-0015, *The Ecological Role of Natural Reefs and Oil and Gas Production Platforms on Rocky Reef Fishes in Southern California*. Variability in platform habitat values and species richness was large compared to natural reef values, suggesting that platforms scheduled for decommissioning should be evaluated individually.

Purpose The purpose of this study is to determine the habitat value of each of the OCS platforms offshore California. MMS scientists will use this information to analyze cumulative impacts of decommissioning platforms to the local and regional fish populations and fisheries. The MMS will also use the information in any environmental assessment done for future platform decommissioning.

Objectives The objectives of this study are: (1) to identify the relative habitat value of each of the offshore platforms on the Pacific OCS; (2) to provide a document that MMS scientists can use to assess and analyze the cumulative effects of offshore decommissioning activities on fish and fisheries.

Methods The contractor will develop a plan to meet the above objectives and shall consider collecting species diversity data, species and community biomass data, and using standard statistical techniques to compare the biological communities on the platforms.

Importance to MMS This study will support the MMS in the environmental analysis of decommissioning projects and in the decision-making process. MMS studies indicate that platforms do create habitat for several species of rockfish, which are experiencing sharp declines in abundance. However, the studies also indicate that each platform is different and that habitat values vary greatly between them. Therefore, it will be crucial to environmental analysis to have a study available that describes the habitat value of each platform and how removal of that habitat will impact the local environment and regional fish populations. The Department of Commerce in

January 2000 declared the west coast rockfish fishery a disaster. The removal of a platform that provides habitat for over 100,000 rockfish would potentially impact this fishery on a regional scale. The information from this study would help MMS scientists assess this impact and add it to the cumulative analysis.

Date Information Required:
This information is needed for proper analysis and decision-making for increased Pacific OCS oil and gas decommissioning activities in the Santa Maria Basin and Santa Barbara Channel.

Revised date: 10/24/00

Region: Pacific Region

Planning Area (s): Southern California

Type: N/A

Title: A Synthesis of the Distribution of Hard Bottom Communities in the Santa Barbara Channel and Santa Maria Basin Compiled from Existing Data from Biological Surveys and Environmental Studies.

Cost Range (in thousands): $80 - $120 **Period of Performance:** FY 2001

Description:

Background The first site specific biological survey conducted in the Santa Maria Basin occurred in 1982 on Leases OCS-P 0404, 0405, 0410 and 0411; entitled, *Biological Survey on Megafaunal Species.* The survey was required in order to ascertain the extent of the a large rocky feature, its associated community of sessile organisms, and fish, in water depths ranging from 900 to over 1700 feet and to determine the potential impacts from exploratory drilling on this community. This ambitious survey was followed by some 17 other biological surveys, which were required for both exploratory and development projects. Nearly 200 video tapes of various formats, written reports, slides, and maps were generated.

The information is in a variety of formats including; paper, video and slides. Additional data and information may include but is not limited to: (1) pipeline corridor surveys and (2) platform jacket surveys.

Objectives

The objectives of this study are to:

1. compile this information into a synthesis correlated with latitude, water depth, sedimentation and other factors and,
2. determine the commonalities and differences among the communities found on the hard bottom features in the Pacific Region.

Methods

Examine the reports, videos, slides and other information from biological surveys and environmental studies that examined hard bottom features.

Importance to MMS One of the driving forces behind requiring biological surveys is the concern that the communities are rare, contain long-lived species and therefore require protection. This study will help to increase our understanding of these communities and help MMS scientists to

properly mitigate potential impacts. Lastly, gaining an overall view of the patterns of communities would provide valuable scientific information useful to government, academia and industry.

Date Information Required
The information is needed by FY 2001-2002 to support NEPA analyses that will be required for anticipated exploratory drilling activity in the Santa Barbara Channel and the Santa Maria Basin.

Revised Date: 10/24/00

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2002-2003

Region: Pacific OCS Region

Planning Area(s): Southern California

Title: A Summary of Knowledge of the Santa Maria Basin Coastal Zone and Offshore Areas

Type: N/A

Cost Range (in thousands): $120 - $180 **Period of Performance:** FY 2002 - 2003

Description:
Background. The last synthesis and interpretation of information relevant to the area was AEcology of the Southern California Bight@ which was published in 1993. This information will be 10 years old by the time the development permitting process begins in 2003.

Objective: The objective of this study is to provide updated descriptions of the geology, climatology, oceanography, marine ecology, terrestrial and coastal ecology, water quality, marine traffic, navigational hazards, physical and biological sciences, industrial and commercial activities, petroleum industry, demographic and socioeconomic, land and water use, pollution sources, transportation, and recreation and tourism of the Santa Maria Basin coastal zone and offshore areas.

Method: The method would involve conducting a comprehensive literature survey and interpretation of existing knowledge in physical and biological sciences and socioeconomic and cultural conditions of the Santa Maria basin coastal zone and offshore areas.

Importance to MMS: Based on the projected level of exploration and development activity in the Santa Maria Basin, it is very important that the Pacific Region has ready access to compiled current information on physical and biological sciences and socioeconomic cultural conditions of the area. This information is needed to prepare environmental documents as required by Federal and State law, and will be used to support the Federal, State, and local government decision making purposes.

Date Information Required: The development review process is projected to begin in 2003 and extend through 2005. The literature surveys should therefore be completed by 2003 .

Revised Date: 9/20/00

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: N/A

Title: Shoreline Assessment of Changes in Rocky Intertidal Communities in the Southern California Bight

Cost Range (in thousands) $890 to $1,330 **Period of Performance:** FY 2002 – 2005

Description:

Background: Baseline studies conducted by BLM/MMS in the late 1970's monitored rocky intertidal sites on the islands and mainland. These provide a benchmark for the resources found in the Southern California Bight (Littler, 1979). The National Park Service initiated a monitoring program in the mid-eighties on the Channel Islands. Mainland monitoring resumed in 1991 with the Shoreline Inventory of Resources Study funded by the MMS in Santa Barbara County. Due to increased tankering concerns from OCS activities, the California Coastal Commission added monitoring sites in Ventura County, Los Angeles County and Santa Cruz Island in 1994. The MMS also expanded monitoring efforts along the mainland to cover areas adjacent to existing operations in Orange County and proposed operations in San Luis Obispo County.

The MMS sponsored a multi-agency workshop including the National Park Service and California Coastal Commission, which led to the development of MARINE – the Multi-Agency Rocky Intertidal Network. Presently, 16 local, State and Federal agencies and private organizations monitor 61 sites. Counties are active participants, both in terms of funding and personnel participation. A Steering Committee, Science Panel, and Database Panel provide guidance for MARINE.

The BLM baseline sites studied in the late 1970's have not been resampled. Key species are notably absent from some sites but a more comprehensive comparison is needed to quantify the changes being observed. This is a recommendation of the MARINE Science Panel and was viewed favorably by the OCS Scientific Committee.

This effort provides a direct continuation of the monitoring of shoreline sites funded by MMS since 1991. For the past several years, shoreline rocky intertidal monitoring, adjacent to oil and gas operations, has been funded through the Coastal Marine Institute. However, the duration, goals, and scope of intertidal monitoring require a separate, integrated effort beyond the scope of projects being supported by the Coastal Marine Institute at UCSB.

Objectives The objectives of this study are 1) To continue monitoring rocky intertidal communities adjacent to OCS operations, 2) To analyze and synthesize data collected in the Southern California Bight by MARINE and 3) To revisit BLM baseline sites in order to analyze the change in these communities over the past twenty years.

Methods Biannual monitoring of existing sites in San Luis Obispo, Santa Barbara, Los Angeles, Ventura and Orange Counties from fall 2001 to Spring 2004 (six sampling visits for each of the 21 sites). This monitoring includes fixed photoquadrats of barnacle, mussel and algal communities; line, irregular and circular transects of motile species such as seastars, abalone, and limpets, surfgrass transects, and full site photography. Specific studies or additional protocols for other species are expected be added to the routine monitoring effort to increase our ability to address questions about the health of these communities adjacent to oil and gas operations. Annual data reports and a final analysis report in Spring 2004 would be prepared for the MMS.

Support for MMS participation in MARINE includes coordinating the MARINE panels, partial support for database design efforts, combining MARINE and MMS data into a common database, support for completing comprehensive surveys of the MMS and other sites, and partial support for the MARINE Science Panel's report evaluating the health of the Southern California Bight Rocky Intertidal Communities.

Importance to MMS This study provides the information essential for determining biological impacts to shoreline resources from an oil spill. The extent and spatial coverage of the data allows us to distinguish between biological effects stemming from oil spills vs. those from natural changes such as the El Nino storm events (Raimondi, 1998). It also provides valuable information about the status and trends of the biological resources adjacent to OCS operations. This data is needed for environmental documents for upcoming drilling projects. The synthesized information will be especially important for EISs and development projects to be submitted in 2002. This information is needed during an oil spill to assess damages to the shoreline. This monitoring approach will allow us to detect as low as a 10-15% change in the communities studied. In the Platform Irene spill, the MMS was able to determine that changes in the rocky intertidal species monitored in the spill zone were not caused by Platform Irene oil.

Date Information Required: Data are needed to complete environmental documents for the Rocky Point Unit and Cavern Point Unit and MODU EIS.

Revised date: 10/16/00

Region: Pacific Region

Planning Area: Southern California

Type: N/A

Title: Status and foraging ecology of the breeding seabirds in the Southern California Planning Area

Cost Range (in thousands) $1,120 to 1,680 **Period of Performance:** FY 2002-2005

Description:

Background: Although the species composition of the seabirds that make up the breeding population of the Southern California Planning Area has been fairly well known for some time, the current status of these species in this area is not available or is known for, at most, two or three species. This area includes the Channel Islands, which provide breeding habitat for at least 12 species of seabirds, including the endangered California brown pelican, and serve as a biogeographic boundary for several species. The Channel Islands also host important populations of two rare species that are nearly endemic to the region, the Xantus' murrelet and ashy storm-petrel; both species are being considered for listing under the Endangered Species Act. Comprehensive surveys of this area were conducted in 1975-1978 and 1991. Surveys in 1991 documented many changes since 1975-1978, including increases in some species (e.g., California brown pelican; Brandt's, double-crested, and pelagic cormorants; western gull; pigeon guillemot), and declines in others (e.g., Cassin's auklet, Xantus' murrelet). In addition, two species, the rhinoceros auklet and tufted puffin, were documented colonizing (auklet) or recolonizing (puffin) the area. Since 1991, a long-term ocean warming event, including two major El Niño events, has highly affected the region, and further changes in the seabird fauna are suspected to have occurred. The foraging ecology of some of the breeding seabirds in this area was examined in 1975-78, but few studies have been conducted since. Climate changes and changes in prey availability, including declines in major prey items (e.g., rockfish and anchovies) and increases in other potential prey items (e.g., sardines), likely have led to changes in diet, foraging areas, and populations.

Objectives: The purpose of this study is to determine the nesting abundance and distribution, diet, and important foraging areas of the breeding seabirds in the Southern California Planning Area, with particular attention to those species proposed for listing as threatened or endangered, and species used as indicators of climate change and anthropogenic impacts.

Methods: This study would use a variety of methods, including aerial and boat surveys, radio-telemetry, diet and prey biomass sampling, and banding to assess the breeding status and foraging ecology of seabird populations in the Southern California Planning Area, where OCS oil and gas activities are currently occurring.

Importance to MMS: Seabirds are often the most documented of natural resources to be impacted

from oil pollution. Information disseminated from the proposed research will aid the MMS with permitting oil and gas development and production projects in the Southern California Planning Area, including the Santa Maria Basin and Santa Barbara Channel. Additionally, study results would be used to enable the MMS to make more informed, scientifically defensible decisions on future post-lease issues with respect to preparation of required National Environmental Policy Act (NEPA) documents, such as environmental impact statements, environmental assessments, and records of decision.

Date Information Required: Development plans are expected to be submitted for leases in the Southern California Planning Area in the next three to five years, and the information from this study would be used to help prepare environmental documents (EIS=s and EA=s) on these plans.

Revised Date: 10/16/00

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: N/A

Title: Santa Maria Basin Shipping Activity Study

Cost Range (in thousands): $80 - $120 **Period of Performance:** FY 2002 - 2003

Description:

Background Shipping lanes pass through the southern end of the Santa Maria Basin and extend seaward north along the coastline. Depending on where operators propose to drill to explore for and recover oil and gas from the undeveloped leases, it is possible that shipping conflicts may exist. Similar issues were raised at the eastern end of the Santa Barbara Channel for exploratory and development projects proposed near shipping lanes. In the 1980's, in response to public concerns, the California Coastal Commission sponsored a study by the California Maritime Academy to look at several potential conflicts at the eastern end of the Channel. That effort updated the vessel traffic frequency and proposed several mitigation plans for possible problem situations in that area.

The Point Arguello EIR/EIR evaluated an Area Study which considered location of a platform in a shipping lane on Lease OCS-P 0322. Shipping and oil and gas activity conflicts may arise, particularly in the Sword Unit, if operators determine that drillships or a new platform would be needed to produce from this field. Strategies for mitigation were deferred in the Area Study to the future for resolution.

The collision data collected by Point Arguello platforms is in a raw form and has not been summarized. Other information dealing with this subject matter pertain to the eastern part of the Santa Barbara Channel and do not address concerns which would be experienced at the southern end of the Santa Maria Basin.

Objectives The objective of this effort is to compile and evaluate a variety of safety data, vessel collision data, and vessel frequency data so that appropriate mitigation strategies can be developed for new projects.

Methods Data collected for the past 10 years on Platform Harvest to document collisions and near collisions would be evaluated. Mitigation measures required for the Point Arguello facilities to alleviate potential hazards would also be evaluated for their effectiveness. The contractor would also evaluate other Maritime Academy, U.S. Coast Guard or other information which details potential hazards, vessel frequency and type, etc. The contractor would obtain input from

concerned agencies in developing appropriate mitigation strategies for identified undeveloped leases in the Santa Maria Basin.

Importance to MMS The information is needed so that the MMS can determine the potential risks associated with different drilling locations and identify appropriate mitigation for upcoming plans of exploration and development.

Date Information Required:
The information is needed now and will become of increased value as the new oil and gas development projects come into the Santa Maria Basin in the next three to five years.

Revised Date: 10/24/00

Region: Pacific OCS Region

Planning Area(s): Southern California

Type: N/A

Title: GIS System Development Cooperation Agreement with UCSB

Cost Range (in thousands): $800 - $1,200 **Period of Performance:** FY 2001 - 2004

Description:

Background UCSB, working cooperatively with the Channel Islands National Marine Sanctuary, has developed an extensive set of geographically oriented environmental and socioeconomic data that is specific to the Sanctuary only. With the obvious emphasis of the Sanctuary on the marine environment, these data are highly applicable to the MMS. Examples of data in the Sanctuary system of interest to the MMS are seabird colonies, important commercial fishing areas, and shipwrecks. However, the geographic area the Sanctuary data covers is very limited compared to the Pacific OCS Region. Also, data of interest to the MMS has not been included in the Sanctuary system, such as hard bottom features.

Objectives The goal of this project is to have UCSB develop a GIS database for the Pacific Region that would both incorporate the Sanctuary data set and expand it to cover the Southern California Planning Area. UCSB would also incorporate existing MMS and other agency data sets in non-digital formats (e.g., hardcopy maps, data lists, etc.) into the final GIS database. UCSB is also working with other agencies in the southern California area, such as the National Park Service, and UCSB should be able to avoid duplicating the database efforts of the MMS and other agencies. UCSB should also be able to make certain that the MMS has the most recent data available and is current with other agencies. The databases developed will be compatible with TIMS and CORIS.

Methods This study is intended to add to the information within the Pacific Region in a rational manner, capitalizing on the work of other state, local, and academic groups. Using the Sanctuary database as a starting point, UCSB will locate similar data sets for the entire Southern California Planning Area, if available, and incorporate those data into the database. For example, UCSB has prepared highly detailed bathymetric data sets for the area encompassed by the Sanctuary. These data sets would be expanded to include other areas of interest to the MMS. Working with the MMS, other federal and state agencies, and academic institutes will also incorporate other types of data of value to the MMS into the system. The database UCSB has developed for the Sanctuary is in ARC/INFO format is compatible with MMS standards.

Importance to MMS Information disseminated from the proposed research will aid the MMS with permitting oil and gas development and production projects in the Southern California Planning Area, including the Santa Maria Basin and Santa Barbara Channel. Additionally, study results would be used to enable the MMS to make more informed, scientifically defensible decisions on future post-lease issues with respect to preparation of required National Environmental Policy Act (NEPA) documents, such as environmental impact statements, environmental assessments, and records of decision.

Date Information Required:
The information is needed now and will becoming of increased value as the new oil and gas development projects come into the Santa Maria Basin in the next three to five years. Projects such as Rocky Point and Cavern Point are example of how those data would be used.

Revised Date: 10/24/00